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The objects of the American Geographical Society are to collect and disseminate geographical information by discussion, lectures, and publications; to establish in the chief city of the United States a place where may be obtained accurate information on every part of the globe; and to encourage such exploring expeditions as seem likely to result in valuable discoveries in geography and the related sciences.

The American Geographical Society is the oldest geographical society in the United States. When it was founded, in 1852, there were but twelve similar societies in the world. Now it exchanges publications with more than four hundred scientific associations. The Society issues a monthly magazine of unusual interest called *The Geographical Review*. It has also a large and growing library—one of the most important geographical libraries of the world; thousands of maps and charts; and a remarkable collection of atlases of the sixteenth, seventeenth, and eighteenth centuries.

Travelers, men of science, and others properly accredited are welcome at the rooms of the Society and may freely use the book and map collections.

Two gold medals have been founded by the Society, the *Cullum Geographical Medal* and the *Charles P. Daly Medal*, which are awarded from time to time to explorers, writers, and men of science who have contributed to the advance of geographical knowledge.

In addition it awards the *David Livingstone Centenary Medal*, founded by the Hispanic Society of America.

The qualifications for Fellowship are an interest in exploration and travel, in the spread of geographical knowledge, and in the advancement of science.

A Fellow is entitled to the use of the Library, Reading and Map Rooms; to admission to all lectures and exhibitions; and to the Society's current publications, which include, besides the magazine, occasional books and maps.

The annual dues are ten dollars.

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*I do hereby give and bequeath to the American Geographical Society of
New York*

TABLE OF CONTENTS

PRINCIPAL ARTICLES

NORTH AMERICA

	PAGES
BOOY, THEODOOR DE. The Turks and Caicos Islands, British West Indies. (1 map, 5 photos)	37-51
FLAHERTY, R. J. Two Traverses Across Ungava Peninsula, Labrador. (1 insert map, 12 photos)	116-132
JEFFERSON, MARK. The Real Temperatures Throughout North and South America. (1 map, 27 diags.).....	240-267
PARKINS, A. E. The Indians of the Great Lakes Region and Their Environment.	504-512
SAVILLE, M. H. The Discovery of Yucatan in 1517 by Francisco Her- nández de Córdoba. (1 map)	436-448
VAN CLEEF, EUGENE. The Finn in America. (5 maps, 13 photos).....	185-214 ✓

SOUTH AMERICA

BOOY, THEODOOR DE. An Exploration of the Sierra de Perijá, Venezuela. (15 photos)	385-410
BOOY, THEODOOR DE. The Western Maracaibo Lowland, Venezuela. (1 insert map in color, 13 photos)	481-500
JEFFERSON, MARK. The Real Temperatures Throughout North and South America. (1 map, 27 diags.).....	240-267
MCBRIDE, G. M. The Galápagos Islands. (1 map)	229-239

EUROPE

BRUNHES, JEAN, AND CAMILLE VALLAUX. German Colonization in Eastern Europe. (1 map)	465-480
CROSS, W. R. Dutch Cartographers of the Seventeenth Century	66-70
GALLOIS, LUCIEN. Alsace-Lorraine and Europe. (1 insert map in color, 5 photos)	89-115
THOMPSON, WILLIAM. Portugal: The Country and The People. (6 photos)	147-155
VALLAUX, CAMILLE, AND JEAN BRUNHES. German Colonization in Eastern Europe. (1 map)	465-480
WALLIS, B. C. Central Hungary: Magyars and Germans. (3 insert maps in color, 1 text map, 1 diag.).....	421-435
WALLIS, B. C. The Peoples of Austria. (5 insert maps in color).....	52-65
WALLIS, B. C. The Rumanians in Hungary. (3 insert maps in color, 1 text map, 2 diags.).....	156-171
WALLIS, B. C. The Slavs of Northern Hungary. (3 insert maps in color, 1 text map, 1 diag.).....	268-281
WALLIS, B. C. The Slavs of Southern Hungary. (3 insert maps in color, 1 text map, 1 diag.).....	341-353
WOODS, H. C. The Balkans, Macedonia, and the War. (1 map, 10 photos)	19-36

AFRICA

HELLER, EDMUND. The Geographical Barriers to the Distribution of Big Game Animals in Africa. (1 map, 14 photos).....	297-319
---	---------

ASIA

ANDREWS, R. C. Traveling in China's Southland. (7 photos).....	133-146
ANDREWS, R. C. Zoölogical Explorations in Yünnan Province, China. (1 map, 11 photos)	1-18

AUSTRALASIA AND OCEANIA

COTTON, C. A. The Outline of New Zealand. (1 map, 7 diags., 11 photos). .	320-340
--	---------

	PAGES
POLAR REGIONS	
PORSILD, M. P. On "Savssats": A Crowding of Arctic Animals at Holes in the Sea Ice. (1 map, 6 photos).....	215-228
STEFÁNSSON, VILHJÁLMUR. The Activities of the Canadian Arctic Expedition from October, 1916, to April, 1918. (1 insert map).....	354-369

WORLD AS A WHOLE AND LARGER PARTS

JEFFERSON, MARK. The Real Temperatures Throughout North and South America. (1 map, 27 diagrs.).....	240-267
---	---------

GENERAL

FRITZ, EMANUEL. A Combined Map and Panorama for Orientation from Lookout Stations. (1 insert plate, 2 photos).....	501-503
NEUBIGIN, M. I. The Origin and Maintenance of Diversity in Man.....	411-420

DEPARTMENTS

Geographical Record.....	71-78, 172-177, 282-289 (2 photos), 370-375, 449-454 (1 diagr.), 513-517 (1 map).
Geographical Publications.....	79-88, 178-184, 290-296, 376-384, 455-464, 518-528.

Officers and Councilors of the American Geographical Society for 1918..	iii
Objects of the Society.....	iv
Index	529-562
Errata	563

Separate Illustrations

[Five maps of] Austria (geographical data compiled by B. C. WALLIS), 1:5,000,000, as follows: (1) Relief; (2) Population Density; (3) Nationalities; (4) Crops; (5) Farm Animals.....	Pls. 1-V, opp. p. 64
[Map of] Lorraine and Alsace: Territorial Changes and Mineral Resources, 1:1,500,000	Pl. VI, opp. p. 112
Map of Two Route Surveys Across Ungava Peninsula, Labrador: (1) via the Povungnituk and Payne Rivers; (2) via Lake Minto and Leaf River, by ROBERT J. FLAHERTY, 1:506,880; with inset: Map of Ungava Peninsula, Labrador, Incorporating the Latest Sources, 1:3,150,000.....	Pl. VII, opp. p. 128
[Three maps of] Eastern Hungary (geographical data compiled by B. C. WALLIS), 1:2,000,000, as follows: (1) Relief; (2) Nationalities; (3) Population Density	Pls. VIII-X, opp. p. 168
[Three maps of] Northern Hungary (geographical data compiled by B. C. WALLIS), 1:2,000,000, as follows: (1) Relief; (2) Nationalities; (3) Population Density	Pls. XI-XIII, opp. p. 280
[Three maps of] Southern Hungary (geographical data compiled by B. C. WALLIS), 1:2,000,000, as follows: (1) Relief; (2) Nationalities; (3) Population Density	Pls. XIV-XVI, opp. p. 352
[Map of] Stefánsson's and MacMillan's Recent Explorations in the American Arctic Archipelago, 1:9,500,000.....	Pl. XVIa, opp. p. 368
Map of the Sierra de Perijá and the Western Maracaibo Lowland, Venezuela-Colombia, based on available material, with additions by THEODOOR DE BOOY, 1:600,000, with inset: The Northern Andes, 1:12,000,000.....	Pl. XVII, opp. p. 496
[Three maps of] West-Central Hungary (geographical data compiled by B. C. WALLIS), 1:2,000,000, as follows: (1) Relief; (2) Nationalities; (3) Population Density.....	Pls. XVIII-XX, opp. p. 432
A Combined Map and Panorama for Orientation from Lookout Stations.	Pl. XVIII [should be Pl. XXI], opp. p. 502

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No. 1

ZOÖLOGICAL EXPLORATIONS IN YÜNNAN PROVINCE, CHINA

By ROY CHAPMAN ANDREWS
American Museum of Natural History

THE PLATEAU OF CENTRAL ASIA

The earliest remains of primitive man probably will be found somewhere in the vast plateau of Central Asia, north of the Himalaya Mountains. From this region came, it is believed, the successive invasions that poured into Europe from the east, into India from the north, and into China from the west; the migration route to North America led over Bering Strait and spread fan-wise south and southeast to the farthest extremity of South America. The Central Asian plateau at the beginning of the Pleistocene was probably less arid than it is today, and there is reason to believe that this general region was the distributing center not only of man but also of many of the forms of mammalian life now found in other parts of the world. For instance, our American moose, the wapiti or elk, the Rocky Mountain sheep, the so-called mountain goat, and other animals are probably of Central Asian origin.

Doubtless there were many causes that contributed to the extensive wanderings of primitive tribes; but, as these tribes were primarily hunters, one of the most important must have been the movements of the game upon which they lived. Therefore the study of the early human races is necessarily closely connected with, and dependent upon, a knowledge of the Central Asian mammalian life and its distribution. No systematic paleontological, archeological, or zoölogical study of this region on a large scale has ever been attempted, and it is safe to say that there is no similar area of the inhabited surface of the earth about which so little is known.

ITS EXPLORATION

The American Museum of Natural History hopes in the near future to conduct extensive explorations in this part of the world along general

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scientific lines. The country itself and its inhabitants, however, present unusual obstacles to scientific research. Not only is the region one of vast intersecting mountain ranges, the greatest of the earth, but the climate is too cold in winter to permit of continuous work. The people have a natural dislike for foreigners, and political events in the last half century have not tended to decrease their suspicions.

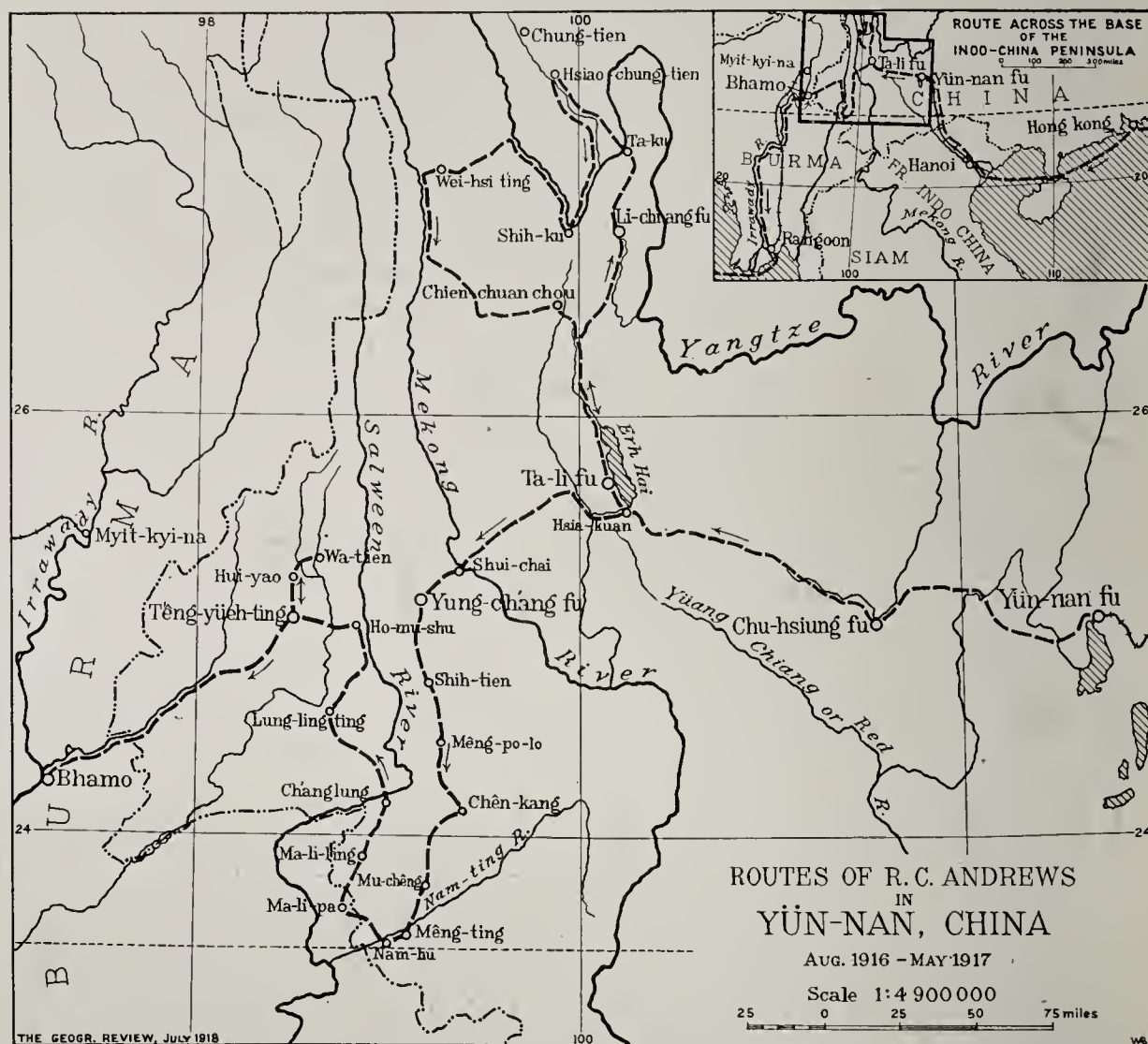


FIG. 1—Sketch map showing the routes of R. C. Andrews in Yün-nan, China, August, 1916–May, 1917. Scale 1:4,900,000. The inset shows the location of the main map and the author's route from Hongkong to Rangoon.

It is possible, indeed, to overcome such difficulties, but the plans for extensive research must be carefully prepared. One of the most important steps is the sending out of preliminary expeditions to gain a general knowledge of the natives and the fauna and of the conditions to be encountered. For the first reconnaissance, which was intended to be largely a mammalian survey, the Asiatic Zoölogical Expedition left New York in March, 1916.

A LITTLE-KNOWN PROVINCE OF CHINA

Its destination was Yün-nan, the southwesternmost province of China. This is one of the least-known parts of the Chinese Republic, and, because



FIG. 2—Gorge of the Yangtze River near Ta-ku ferry, Yün-nan.

This is in the region where the upper Salween, Mekong, and Yangtze Rivers, flowing in deep longitudinal valleys between the lofty ranges of the mountains that sweep southward from the Tibetan plateau to the tip of the Malay Peninsula, approach each other to within 20 or 25 miles. While the other two continue southward to the sea the Yangtze turns to the east and breaks through the mountains. In so doing it here doubles back upon itself, making a loop some 60 miles long and only 15 miles wide.

(Figs. 2-12 from photographs by Yvette Borup Andrews.)

of its southern latitude and high mountain systems, the climatic and faunal range is very great. It is about equal in size to the state of California and topographically might be likened to the ocean in a furious gale, for the greater part of its surface has been thrown into vast mountain waves which divide and cross one another in hopeless confusion.

Yün-nan is bordered on the north by Szechuan and a small portion of Tibet, on the west by Burma, on the south by Tonking, and on the east by Kweichau and Kuangsi Provinces. Faunistically the entire northwestern part of Yün-nan is essentially Tibetan, and the plateaus and mountain peaks range from altitudes of 8,000 feet to 20,000 feet above sea level. In the south and west along the borders of Burma and Tonking, in the low fever-stricken valleys, the climate is that of the mid-tropics, and the native life as well as the fauna and flora are of totally different types from those found in the north.

The natives of Yün-nan are exceptionally interesting. There are about thirty non-Chinese tribes in the province, some of which, such as the Shans and Lolos, represent the aboriginal inhabitants of China. It is safe to say that in no similar area of the world is there such a variety of languages and dialects spoken as in this region.

PERSONNEL OF THE EXPEDITION

The white members of the first Asiatic Zoölogical Expedition included Mr. Edmund Heller, whose attention was chiefly devoted to the collection of small mammals, my wife, Yvette Borup Andrews, who acted as photographer, and myself, in general charge of the party. A Chinese interpreter, Wu Hung-tao, with five native assistants and ten muleteers completed the personnel. After a short side trip in the Province of Fukien, to hunt tigers, we outfitted in Hongkong and in late August left for Yün-nan by way of the French railroad through Tonking.

BY RAIL TO YÜN-NAN FU

The railroad is a remarkable engineering achievement, for it was constructed in great haste through a difficult mountainous range. Yün-nan is an exceedingly rich province, and the French were quick to see the advantages of drawing its vast trade to their own seaports. The British were already making surveys to construct a railroad from Bhamo on the headwaters of the Irrawady River across Yün-nan to connect with the Yangtze, and the French were anxious to have their road to Yün-nan fu in operation some time before the rival line could be completed.

Owing to its hasty construction and the heavy rainfall, or perhaps to both, the tunnels frequently cave in and bridges are washed away (over the mountains there is a tunnel or bridge almost every mile) so that the railroad is chiefly remarkable for the number of days in the year in which it does not operate; nevertheless the French deserve great credit for their

enterprise. While the railroad was being built through the fever-stricken jungles of Tonking the coolies began to die like flies, and it was necessary to suspend all work during the summer months.

When we arrived in Yün-nan fu we found a surprisingly cosmopolitan community housed within its grim old walls. There were consuls, missionaries, Chinese officials, and representatives of business firms in Hongkong; all received us with the open-handed hospitality characteristic of the East.

BY CARAVAN TO TA-LI FU

On September 9 we left Yün-nan fu with a caravan of thirty-three mules and horses. Our destination was Ta-li fu, the largest city in central Yün-nan, fourteen days' travel directly west. When we were fairly launched upon our long ride the time slipped by in a succession of delightful days. Since this was the main caravan route, the *mafus* (muleteers) had regular stages beyond which they would not go. If we did not stop for luncheon the march could be ended early in the afternoon and we could settle ourselves for the night in a temple, which always proved a veritable "haven of rest" after a long day in the saddle.

For centuries this road has been one of the main trade arteries through the province, and, with that total lack of any idea of conservation so characteristic of the Chinese, every available bit of natural forest has been cut away. As a result the mountains are desert wastes of sandstone alternating with grass-covered hills sometimes clothed with groves of pines or spruces. These trees have all been planted and, before they have reached a height of fifteen or twenty feet, will yield to the insistent Chinese demand for wood.

The ignorance of the need of forest conservation is an illuminating commentary on Chinese education. Mr. William Hanna, a missionary of Ta-li fu, told us that one day he was riding over this same road with a Chinese gentleman who was considered to be one of the best educated and most learned men of the province. Pointing to the barren hills washed clean of soil and deeply worn by countless floods, Mr. Hanna remarked that all this could have been prevented and that instead of a rocky waste there might have been a fertile hillside had the trees been left to grow. The Chinese scholar listened in amazement to facts which every western schoolboy has learned before he is twelve years old, but of which he was ignorant because they are not a part of Confucius' teachings. To study modern science is considered a waste of time by the orthodox Chinese, for "everything good must be old," and all his life he delves into the past, utterly neglectful of the present.

Every valley along the road was green with rice fields, and this together with the deforestation of the mountains is responsible for the almost total lack of animal life. Night after night we set traps about our temple camps only to find them untouched in the morning. There were no mammals with



FIG. 3—Ta-li fu, seen from the walls surrounding the town.

the exception of a few red-bellied squirrels (*Callosciurus erythraeus*) and now and then a tree shrew (*Tupaia chinensis*).

As we neared Ta-li fu and indeed along the entire road we were amazed at the prevalence of goiter. At a conservative estimate two out of every five persons were suffering from the disease, some having two, or even three, globules of uneven size hanging from their throats. In one village six out of seven adults were affected; apparently children under twelve or fourteen years are free from it, as we saw no evidences in either sex. Probably the disease is in a large measure due to the drinking water, for it is most prevalent in the limestone regions and seems to be somewhat localized.

On Friday, September 24, we reached Hsia-kuan, a large commercial town at the lower end of Erh Hai, the lake near which Ta-li fu lies. Many merchants live there, and it is by all means the most important business place of interior Yün-nan; Ta-li, eight miles away, is the residence and official city.

This was the hottest day of our experience in the northern part of the province, the thermometer registering 85° in the shade. This is the usual mid-summer temperature, but the moment the sun dropped behind the mountains it was cool enough for one to enjoy a fire. Even in winter it is never very cold, and the delightful summer should make northern Yün-nan a wonderful health resort for residents of fever-stricken Burma and Tonking.

TA-LI FU

We rode toward Ta-li with the beautiful lake on our right hand and on the other the Tsang Shan, mountains which rise to a height of 14,000 feet. As we approached the city we could see dimly outlined against the mountains the slender shafts of three ancient pagodas. They were erected to the spirits of the "earth, wind, and water" and for over fifteen hundred years have stood guard over the stone graves which, in countless thousands, are spread along the foot of the mountains like a vast gray blanket. In the late afternoon sunlight the walls of the city seemed to recede before us, and the picturesque gate loomed shadowy and unreal even when we passed through its gloomy arch and clattered up the stone-paved street.

Besides Mr. Evans, the representative of the British-American Tobacco Company, the foreign residents of Ta-li fu include the Rev. William J. Hanna, his wife, and two other women, all of the China Inland Mission. Mr. Hanna is doing a really splendid work, especially along educational and medical lines. He has built a beautiful little chapel and a large school and dispensary in connection with his house, where he and his wife are occupied every morning treating the minor ills of the natives, Christian and heathen alike.

Ta-li fu was the scene of tremendous slaughter at the time of the Mohammedan war, when the Chinese captured the city through the

treachery of its commander and turned its streets into rivers of blood. The Mohammedans were almost exterminated, and the ruined stone walls testify to the completeness of the Chinese devastation.

Ta-li fu and Hsia-kuan are large fur markets, and we spent some time investigating the shops. One important find was the panda (*Aelurus fulgens*). The panda is an aberrant member of the racoon family but looks more like a fox; in fact the Chinese call it the "fire fox" because of its beautiful red fur. Pandas were supposed to be exceedingly rare, and we could hardly believe our eyes when we saw dozens of coats made from their skins hanging in the fur shops.

Skins of the huge red-brown flying squirrels, *Petaurista yunnanensis*, were also used for clothing, and the abundance of this animal was almost as great a surprise as were the pandas. This is often the case with supposedly rare species. A few specimens are first secured, perhaps from the extreme limits of its range or from a locality where it really is rare, and for years such specimens may be unique in museum collections; but eventually the proper locality may be visited and the animals found to be abundant.

We saw several skins of the beautiful cat *Felis temnicki*, which, with skins of the snow leopard (*Felis uncia*), were said to have come from Tibet. Civets, bears, foxes, and small cats were being used extensively for furs, and pangolins could be purchased in the medicine shops. The scales of the pangolin are considered of great value in the treatment of certain diseases, and the skins are usually sold by the pound, as are the horns of deer, wapiti, gorals, and serows.

Almost all of the fossil animals which have been obtained in China by foreigners have been purchased in apothecary shops. If a Chinaman discovers a fossil bed he guards it zealously for it is as good as a gold mine to him. The bones are ground into a fine powder and when mixed with an acid produce a phosphate which has in reality a certain value as a tonic. When a considerable amount of faith and Chinese superstition is added, its efficacy is doubled.

LI-CHIANG FU AND THE MOSOS

We left a portion of our outfit at Ta-li fu and with a new caravan of twenty-five animals traveled northward for six days to Li-chiang fu. We took a byroad in the hope of finding good collecting in the pine forests three days from Ta-li but instead found a total absence of animal life. The woods were beautiful parklike stretches which in a country like California would be full of game but here were silent and deserted. During the fourth and fifth days we were still in the forests but on the sixth crossed a pass 10,000 feet high and descended abruptly into a long marshy plain where the gray outlines of Li-chiang were dimly visible against the mountains at the far end.

The city is a most interesting place, especially on market day, for its inhabitants represent many different tribes, with comparatively few Chinese. By far the greatest percentage of natives are the Mosos,¹ who are semi-Tibetan in their life and customs. They were originally an independent race ruling a considerable portion of northern Yün-nan and having Li-chiang as their capital. To the effeminate, insincere, and "highly civilized" Chinese they are "barbarians," but we found them to be simple, honest, and wholly delightful people. Many of those whom we met later

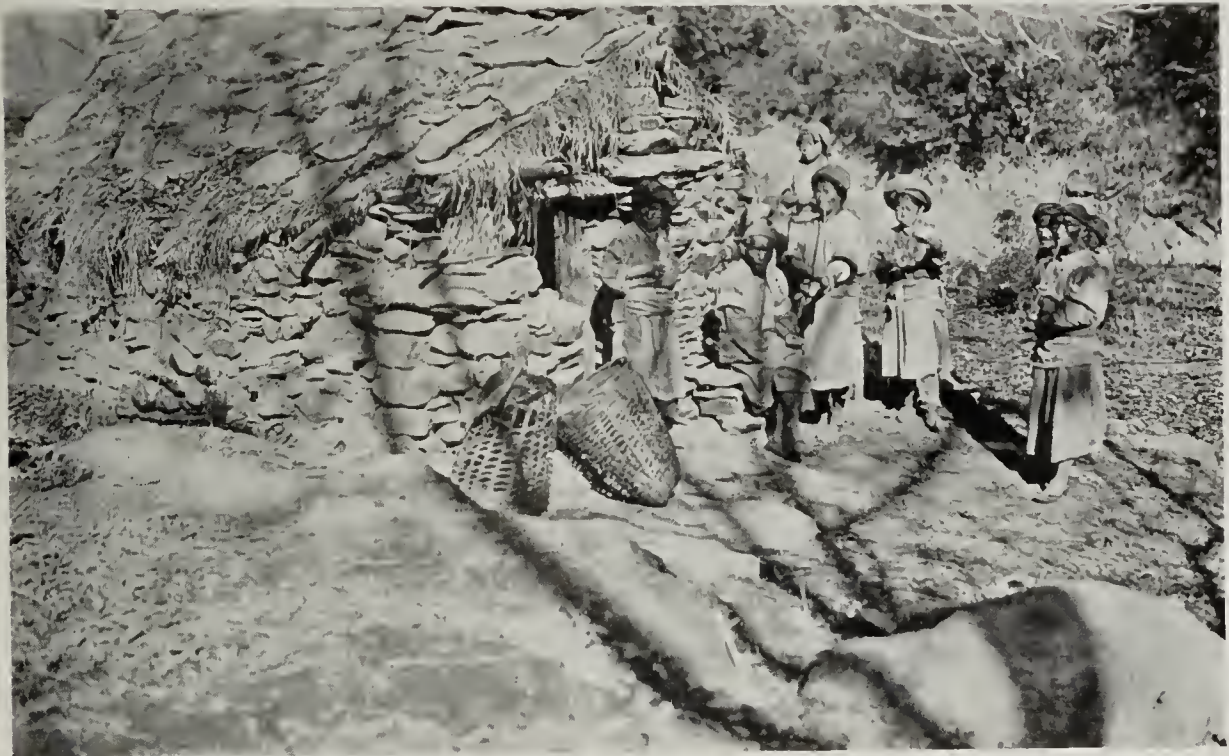


FIG. 4—A Moso house near Li-chiang.

had never seen a white woman, and yet their inherent decency was in the greatest contrast to the Chinese, who consider themselves immeasurably their superior.

The Mosos have large herds of sheep and cattle, and this is the one place in the Orient, except in large cities along the coast, where we could obtain fresh milk and butter. With them as with the Tibetans buttered tea and *tsamba* (parched oatmeal) are the great essentials. Buttered tea is prepared by churning fresh butter into hot tea until the two have become well mixed. It is then thickened with finely ground *tsamba* until a ball is formed which is eaten with the fingers. The combination is decidedly good when the ingredients are fresh, but if the butter happens to be rancid the less said of it the better. The Mosos also raise great quantities of excellent squash, turnips, carrots, cabbage, potatoes, onions, corn, peas, beans,

¹ For a brief account of the Mosos see the article by Dr. Laufer commenting on the American Geographical Society's Moso manuscript, *Geogr. Rev.*, Vol. 1, 1916, pp. 274-285; cf. also the account of lamasery life at Wei-hsi by the late Francis H. Nichols, who procured the manuscript, *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 100-114.—EDIT. NOTE.

oranges, pears, persimmons, and nuts. While traveling we had our saddle pockets filled with pears and English walnuts or chestnuts and could replenish our stock from almost any village along the road. Everything was absurdly cheap. Eggs were usually about eight cents (Mexican) a dozen, and we could always purchase a chicken for an empty tin can, or two for

a bottle. In fact bottles were in great demand, and when offers of money failed to induce a native to pose for the camera a bottle would nearly always decide him.



FIG. 5—A Moso with a porcupine. The natives of northern Yün-nan use crossbows with poisoned arrows.

GORALS AND SEROWS

At Li-chiang we learned that there was good shooting only twelve miles north of the city on the Snow Mountain range, the highest peak of which rises 18,000 feet above the sea. Proceeding thither we camped in a beautiful little meadow at an altitude of 12,000 feet, and for a month had some remarkably successful hunting on the slopes of the Snow Mountain. Our attention was chiefly centered upon gorals and serows, of which we obtained a splendid series.

These animals belong to the subfamily *Rupicaprinae*, which is an early mountain-dwelling offshoot of the Bovidae; this subfamily also includes the chamois, takin, and the so-called Rocky Mountain goat of America. The group is commonly referred to as "goat-antelopes" in order to express the intermediate position which they are supposed to hold between the true goats and antelopes. They are also sometimes called the Rupicaprine antelopes from the scientific name of the chamois (*Rupicapra*).

The horns of all members of the group are finely ridged and subcylindrical. They are present in both sexes, being almost as long in the female as in the male. Although no one would suspect that the gorals are more closely related to the takins than to the serows, which they resemble superficially, such seems to be the case, but the cranial differences between the two genera are to a certain extent bridged over by the skull of the small Japanese serow (*Capricornulus crispus*). One of the principal differences, besides that of size, is in the fact that the serows have a short tail and a

well-developed face gland, which opens in front of the eyes by a small orifice, while the gorals have a long tail and no such gland.

FROM SNOW MOUNTAIN TO TA-KU FERRY

In mid-November we left the Snow Mountain with a caravan of twenty-six mules and horses. Following the road from Li-chiang to the Yangtze we crossed the "Black Water" and climbed steadily upward over several tremendous wooded ridges each higher than the last to the summit of the divide.

The descent was gradual through a magnificent pine and spruce forest. Some of the trees were at least 150 feet high and were draped with beautiful gray moss which had looped itself from branch to branch and hung suspended in delicate streamers yards in length. The forest was choked with underbrush and a dense growth of dwarf bamboo, and the hundreds of fallen logs carpeted with bronze moss made ideal conditions for small mammal collecting. However, as the species would probably all be similar to those we had secured on the Snow Mountain we did not feel that it was worth while stopping to trap.

Two days later we rode along a broad trail through a beautiful pine forest and stood on an open summit gazing on one of the most impressive sights which China has to offer. At the left, and a thousand feet below, the mighty Yangtze has broken through the mountains and made a gorge a mile deep, a gorge which seems to have been carved out of the solid rock sharp and clean as by a giant's knife. A few miles to the right the mountains widen, leaving a flat plain two hundred feet above the river. Every inch of this plain, as well as the finger-like valleys which stretch upward between the hills, is under cultivation, giving support to three villages, the largest of which is Ta-ku.

The ferry is in a bad place, but it is the only spot for miles where the river can be crossed. The right (east) bank is so precipitous that the narrow trail from the plain twists and turns like a snake before it emerges upon a narrow sand and gravel beach. The opposite side of the river is a vertical wall of rock which slopes back a little at the lower end to form a steep hillside covered with short grass. The landing place is a mass of jagged rocks fronting a small patch of still water, and the trail up the face of the cliff is so steep that it can not be climbed by any loaded animal, so that all the packs had to be unstrapped and laboriously carted up the slope on the backs of the *mafus*.

The cliffs above the river are honeycombed with caverns. They are of two kinds, gold quarries and dwelling caves. The latter consist of a long central shaft, which widens into a circular room, and is just high enough to allow a man to stand erect. Along the sides of the corridor shallow nests have been scooped out to serve as beds, and all the cooking is done not far from the door. The caves, although almost dark, make fairly comfortable



FIG. 6.



FIG. 7.

FIG. 6—The Mekong River southwest of Wei-hsi.

FIG. 7—The Mekong valley southwest of Wei-hsi. The sides of the mountains are here cultivated; the patches of white are corn.



FIG. 8.



FIG. 9.

FIG. 8—The Mekong-Salween divide from the summit of a 12,000-foot pass east of Wei-hsi.
FIG. 9—In the unmapped country between the Yangtze River and the Chung-tien road.

living quarters and are by no means as dirty or as ill-smelling as the ordinary native house. The mines are straight shafts dug into the cliffs; in them rock is quarried and crushed by hand.

CHUNG-TIEN AND THE TIBETANS

From the Yangtze River we traveled northwestward across an unmapped area toward Chung-tien, a village well within the Tibetan sphere of in-

fluence, where Chinese authority is merely nominal. The region was one of vast mountain ridges, from 10,000 to 15,000 feet in height, heavily forested with pine and spruce. There are but few inhabitants, for the precipitous mountain sides offer little opportunity for agriculture and game is not abundant.

When we reached the Chung-tien road we were on one of the great trade routes into Tibet, and over it caravans were continually passing laden with tea or pork. Many of them



FIG. 10—Two Tibetans with their leading caravan mule.

had traveled the entire length of Yün-nan to Sze-mao on the Tonking frontier, where a special kind of tea is grown, and were hurrying northward to cross the snow-covered passes which form the gateways to the "Forbidden Land."

Every Tibetan is a study for an artist. He wears a fur cap, a long loose coat like a Russian blouse thrown carelessly off one shoulder and tied in about the waist, blue or red trousers, and high boots of felt or skin reaching almost to the knees. A long sword, its hilt inlaid with bright-colored bits of glass or stones, is half concealed beneath his coat, and he is seldom without a gun or a murderous-looking spear. In the breast of his loose coat, which serves for a pocket, he carries a remarkable assortment of articles: a pipe and tobacco, tea, *tsamba*, cooking pots, a snuffbox, and hanging down in front a metal charm to protect him from bullets and sickness.

The eastern Tibetans are men of splendid physique and great strength and are frequently more than six feet in height. They have brick red

complexions, and many are really handsome in a full-blooded, masculine way. Their straight features suggest a strong mixture of other than Mongolian stock. They are the direct antithesis of the Chinese in every particular; their strength and virility and the dashing swing of their walk are refreshing to look upon after contact with the ease-loving, effeminate Chinamen whom we generally saw carried along the road sprawling in mountain chairs.

TO WEI-HSI BY WAY OF SHIH-KU

On September 5, after a heavy fall of snow, we left the Chung-tien region for an eight-day trip to Wei-hsi, not far from the Mekong River. Although we looked forward with no pleasure to the long ride over the mountain passes which separated us from Wei-hsi, we expected to find new mammals in the Mekong valley. We followed down the river gorge at the upper end of which Chung-tien is located and left the forests when we emerged on the main road. From the top of a 10,000-foot pass there was a magnificent view down the canyon to the snow-capped mountains, which were beautiful beyond description in their changing colors of purple and gold.

On the second day we saw before us seven snow-crowned peaks as sharp and regular as the teeth of a saw and reached the mouth of the stream where it spreads like a fan over a sandy delta and empties into the Yangtze. Here the mighty river, flowing proudly southward from its home on the wind-blown steppes of the "Forbidden Land," countless ages ago found the great Snow Mountain range barring its path. Thrust aside, it doubled back upon itself along the barrier's base, restlessly seeking a passage through the wall of rock. Far to the north it bit hungrily into the mountain's side again, broke through, and swung south, gathering strength and volume from hundreds of tributaries as it rushed onward to the sea.

For two days we rode along the river bank and crossed at the Shih-ku ferry. There was none of the difficulty here which we had experienced at Ta-ku, for the river is wide and the current slow. It required only two hours to transport our entire caravan, while at the other ferry we had waited a day and a half. Strangely enough, while there are dozens of villages along the Yangtze and the valley is highly cultivated, we saw no sign of fishing. Moreover, we passed but three boats and five or six rafts, and it was evident that this great waterway, which for fifteen hundred miles from its mouth influences the trade of China profoundly, is here used but little by the natives.

After two and a half days' travel up the Yangtze we turned westward toward Wei-hsi and on December 11 had tiffin on the summit of a 12,000-foot pass in a beautiful snow-covered meadow, from which we could see the glistening peaks of the vast mountain range which forms the Mekong-Salween divide. In the afternoon we reached Wei-hsi and camped in a

grove of splendid pine trees on a hill overlooking the city. The place was rather disappointing after Li-chiang. The shops were poor, and it was difficult to buy rice even though the entire valley was devoted to paddy fields, but we did get quantities of delicious persimmons.

Wu told us that seven different languages were spoken in the city, and we could well believe it, for we recognized Mosos, Lolos, Chinese, and Tibetans. This region is nearly the extreme western limit of the Moso tribe, which appears not to extend across the Mekong River.

ON THE MEKONG

From Wei-hsi a stiff climb of a day and a half over a thickly forested mountain ridge, frozen and snow-covered, brought us in sight of the green waters of the Mekong, which has carved a gorge for itself in an almost straight line from the bleak Tibetan plateaus to this part of Yün-nan on its way southward through Indo-China to the sea.

Our second camp was on the river at the mouth of a deep valley, near a small village. Wu said that the natives were Lutzus, and I am inclined to believe that he was right, although Major Davies on his map² indicates this region to be inhabited by Lisos. At any rate these people both in physical appearance and dress were quite distinct from the Lisos whom we met later. They were exceedingly pleasant and friendly, and the chief, accompanied by four venerable men, brought a present of rice. I gave him two tins of cigarettes, and the natives returned to the village wreathed in smiles. The garments of the Lutzus were characteristic and quite unlike those of the Mosos, Lisos, or Tibetans. The women wore a long coat or jacket of blue cloth, trousers, and a very full pleated skirt. The men were dressed in plum-colored coats and trousers.

The Mekong on an average is not more than a hundred yards wide in this region, and, like the Yangtze, its water is very green from the Tibetan snows. The prevailing rock is red slate and sandstone, instead of limestone, as in the country to the eastward. The sides of the valley are so precipitous that it would seem impossible for a human being to walk over them, and yet they are patched with brown cornfields from the summit to the water. Considering the small area available for cultivation there are a considerable number of inhabitants; they have gathered into the villages and seldom live in isolated houses, as in the Yangtze valley.

Wherever a stream comes down from the mountain's side or can be diverted by irrigating ditches, the ground is beautifully terraced for rice paddys; but in other places, corn and peas appear to be the principal crops. Very few vegetables, such as turnips, squash, carrots, and potatoes, are raised; this is rather remarkable since they are so abundant in all the country between the Mekong and the Yangtze Rivers. In several places the water was spanned by rope bridges. The cables are made of twisted

² Map of Yün-nan. 1:1,267,200. Geogr. Section, General Staff No. 2112, War Office, London, April, 1906, corrected to Dec., 1908.



FIG. 11.



FIG. 12.

FIG. 11—In the unmapped country between the Mekong and Ta-li fu.
 FIG. 12—The Yangtze gorge near Ta-ku ferry (see Fig. 2).

bamboo; and, since one end is necessarily higher than the other, there are always two ropes—one to cross each way. The traveler is tied by leather thongs in a sitting position to a wooden "runner" which slides along the bamboo cable and shoots him across the river at tremendous speed.

The valley is hopeless from a zoölogical standpoint. It is too dry for small mammals, and the mountain slopes are so precipitous, so thinly forested, and so generally undesirable that, except for gorals, no other large game would live there. The bird life is decidedly uninteresting. There are no cranes or shelldrakes, and except for a few flocks of mallards which feed on the rice fields we saw no other ducks or geese.

SALT WELLS

On December 20 we turned away from the Mekong valley and began to march southeast by east across an unmapped region in the direction of Ta-li fu. Five days later we reached a very dirty Chinese town in a deep valley near some extensive salt wells. Red clay dust lay thickly over everything, and the filth of the streets and houses was indescribable. When we left on the following day we passed dozens of caravans and groups of men and women carrying great disks of salt. Each piece was stamped in red with the official mark, for salt is a government monopoly and only licensed merchants are allowed to deal in it; moreover, the importation of salt from foreign countries is forbidden. For purposes of administration China is divided into seven or eight main circuits, each of which has its own sources of production, and the salt obtained in one district is not to be sold in another. In Yün-nan salt is supplied from three regions. The water from the wells is boiled in great caldrons for several days, and the resulting deposit is earth, impregnated with salt. This is crushed, mixed with water, and boiled again until only pure salt remains.

RESULTS

On January 5 we again reached Ta-li fu. Our work in the north had brought us a collection of 1,300 mammals as well as several hundred birds, much material for habitat groups, and a splendid series of photographic records in Paget color plates, black and white negatives, and motion-picture film; but what was of first importance, we had covered an enormous extent of diverse country and learned much about the distribution of the fauna of northern Yün-nan. The 1,300 mammals of our collection were taken in a more or less continuous line across six tremendous mountain ranges and furnish an illuminating cross-section of the entire region from Ta-li fu north to Chung-tien and west to the Mekong River. It is apparent that in this portion of the province even the smallest mammals are widely spread and that the principal factor in determining distribution is the flora. Neither the highest mountain ridges nor such deep, swift rivers as the Yangtze and the Mekong appear to act as effective barriers to migration, and as long as the vegetation remains constant the fauna changes but little.

THE BALKANS, MACEDONIA, AND THE WAR*

By H. CHARLES WOODS

Throughout the last few decades and more especially since the re-establishment of the Ottoman constitution in the year 1908, the political and military situations in the Near East have been of worldwide importance. On the one hand the Balkan Peninsula and Asia Minor, inhabited as they are by many diverse peoples, have been the scene of many an insurrection and massacre. On the other hand the rivalry which has existed for years between the Powers of the former Triple Entente and the Triple Alliance, or more correctly the long-planned schemes for Germanic domination in the East, have made this area an ever-present "danger zone of Europe."

International Relations

The fundamental reasons which have forced the Near East into prominence before and since the outbreak of the war are in many ways identical. The real point is that the Balkan Peninsula and the waterways which it controls constitute the natural highway, the natural means of communication between the West and East on the one hand and the North and South on the other. While it is the former condition which makes the domination of this area one of Germany's primary objects it is the latter which constitutes its real importance for Russia. Consequently, whereas by military penetration across the Balkans into southern Russia and Asiatic Turkey the Central Powers have temporarily greatly increased the strength of their military position, still more by the driving of a permanent wedge through the same areas would they have triumphed by endangering the safety of the Allies throughout the world. On the other hand, were good relations to be established between the Balkan states and were an anti-German barrier therefore to be established, what would amount to an Allied wedge would prevent the expansion of the Central Powers toward the East and at the same time assure to Russia her legitimate access to warm water. For years, therefore, the question of these wedges has constituted the real *raison d'être* of the Near East in the world's politics—a *raison d'être* the importance and meaning of which has become more apparent to the everyday man since the outbreak of the war.

Inter-Balkan Relations

So much for the international reasons which have forced the Near East into prominence. From a local standpoint, and only to touch upon a

* A section from a forthcoming book entitled: "The Cradle of the War" (Little, Brown, & Co.).

problem of vital significance, the greatest difficulties of the Balkan question are due largely to the mixed nature of the population in many of the disputed areas and to the complicated nature of the geography of the country. Thus, while almost throughout what is known as Macedonia Albanians, Bulgars, Greeks, Serbs, and Vlachs (Arumani) dwell intermingled in various proportions, nobody who has ever traveled there is able to consider that unhappy district as a concrete whole. He thinks of it as territory which is divided politically and geographically into watertight compartments, as a place inhabited by diverse populations, and as a locality possessed of well-defined if not adequately developed lines of communication.

The present seems a favorable moment at which to discuss some of the basic facts of the problems of the Near East and in particular for a review of the larger aspects of the Macedonian question and of the Saloniki campaign. In order to understand the many complications and ramifications of the Balkan question, it is necessary to refer at least to some of the events which preceded and immediately followed the Balkan Wars of 1912 and 1913. In 1912, largely as a consequence of the attitude of the Young Turks towards the subject nationalities of the Ottoman Empire in Europe, the Balkan Alliance was finally formed. I was in the East during the earlier part of the negotiations which led up to its formation and had the opportunity of discussing the question with most of the responsible ministers. I will therefore endeavor to remind my readers of some of the salient features of the two treaties or series of treaties of which Bulgaria was, so to speak, the central figure, and this because the arrangements consisted not of a triple alliance, but of a Serbo-Bulgarian and a Greco-Bulgarian treaty.

The Balkan Wars

PRELIMINARIES TO THE FIRST BALKAN WAR

The Serbo-Bulgarian pact, in the shape of a treaty of alliance and a secret annex, was signed on March 14, 1912 (N. S.), as a conclusion of a series of negotiations following the outbreak of the Turco-Italian war. The treaty, which is published together with other documents by M. Guéchoff, former Bulgarian Premier, in his book on the Balkan league,¹ was defensive in character. It definitely guaranteed the support of each party to the other in the event of an attack by one or more states or in the event of any Great Power attempting to invade or annex any part of the then Turkey in Europe in a manner contrary to the vital interests of either party, and it bound the two countries not to conclude peace independently. The secret annex, which turned out to be more important than the actual treaty, foresaw the probability that internal or external difficulties in Turkey itself might render the maintenance of the *status quo* impossible and fixed the terms upon which action might then be taken. In addition it definitely

¹ I. E. Guéchoff: *L'Alliance Balkanique*, Hachette, Paris, 1915; reference on pp. 191-202.



FIG. 2.—General view of Monastir. (Figs. 2-9 and 11 from photographs by the author.)

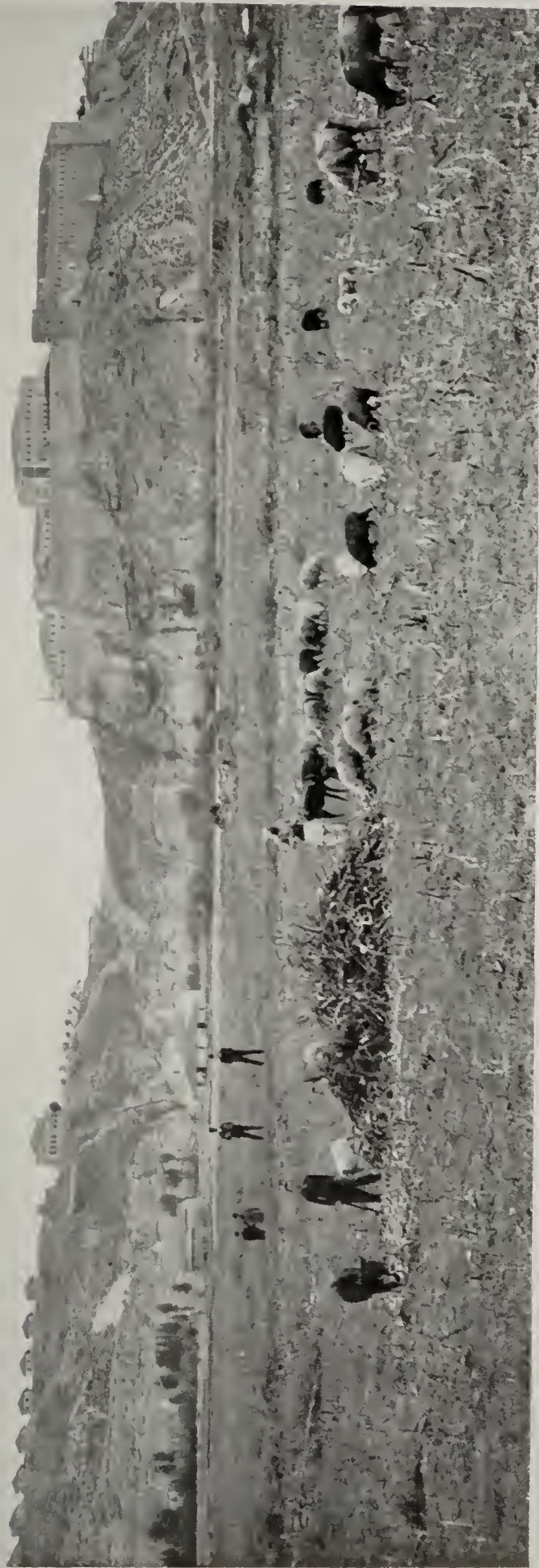


FIG. 3—The barracks and government buildings on the hill commanding and forming part of Üsküb (Skopje).

decided the future distribution of any areas acquired either as a result of the defensive treaty or of what may be called the offensive annex. While all territorial gains were to constitute common property, Serbia recognized the right of Bulgaria to the territory east of the Rhodope Mountains and the Struma River, while Bulgaria recognized a similar right of Serbia to the territory north and west of the Shar Dagh. With regard to the area lying between these two boundaries, if the two parties became convinced that the formation of an autonomous province was impossible, then Serbia undertook to ask for nothing beyond a line drawn from Mount Golem on the northeast to Lake Okhrida on the southwest. Bulgaria promised to accept this line if His Majesty the Czar, who was to be requested to arbitrate, decided in its favor. While tentative negotiations between Bulgaria and Greece had taken place as early as May, 1911, these, as also the subsequent conversations, failed to materialize until after the signature of the Serbo-Bulgarian treaty. However, in May, 1912, the Hellenic Government agreed to the Bulgarian proposals, and a definite treaty was signed at Sofia on the 29th of that month.² That treaty guaranteed to each of its signatories the support of the other in case of war with Turkey, but it is important to remember that it made no arrangement whatever as to the future distribution of the territories to be acquired in a common war. With regard to Montenegro's position, an oral understanding was concluded between that country and Bulgaria in September, 1912.

DEVELOPMENTS DURING THE BALKAN WARS

It is not within the scope of this article to enter into the events which immediately preceded or took place during the Balkan Wars. Sufficient be it to say that the first Balkan peace congress proved abortive largely because the Turks refused to agree to the Allied demands. During the first phase of the Balkan struggle, however, two important developments had taken place which were destined greatly to influence the future trend of events in southeastern Europe. I refer to the international crisis arising out of the attitude of the Dual Monarchy, secretly supported by Germany, upon the Adriatic question and to the differences that arose between Serbia and Bulgaria. The first of these questions led to the recognition of the principle of autonomy for Albania. This decision on the part of the London Ambassadorial Conference, whilst actuated by the fact that Austria "would not allow Serbia to reach the Adriatic," was undoubtedly justified by the existence of the Albanians as a nationality and by their desire for independent government.³ It nevertheless entailed a great disappointment for Serbia and was partly responsible for the beginning of her bad relations with Bulgaria.

Early in February, 1913, and at the outset of the second phase of

² Guéchoff, *op. cit.*, pp. 223-228.

³ See article by the author, "Albania and the Albanians," in the *April Review* (Vol. 5, 1918, pp. 257-273).

the first Balkan War, the relations existing between Bulgaria and Serbia were therefore far from satisfactory, and they continued to grow worse. Moreover there had begun a definite pegging out of Greek claims in Macedonia, together with negotiations between that country and Serbia for the purpose of the conclusion of a defensive treaty against Bulgaria. It was this last-named development in the situation that mainly brought about the estrangement, and particularly the fact that early in 1913, before the conclusion of the first Balkan War and on the initiative of Greece, these two countries, who previously had no direct obligations towards one another, entered into a secret arrangement in regard to the division of spoils secured from Turkey. The basis of that arrangement was that the Greeks would raise no objection to the Serbian retention of Monastir, allotted to Bulgaria by the Serbo-Bulgarian treaty of 1912, provided the Government of King Peter were willing to sanction the incorporation of Saloniki in the Hellenic Kingdom. That arrangement was followed by the more formal Greco-Serbian treaty, which we now know to have been signed on June 1, 1913, and therefore two days after the conclusion of the London Peace Conference.

It is not necessary to discuss here the arguments put forward by the various claimants prior to the outbreak of the second Balkan War, in which Rumania threw her lot against Bulgaria: we are rather concerned with its termination, the fatal Treaty of Bucharest.

THE TREATY OF BUCHAREST

That treaty, ignoring not only the political arrangements made before the first Balkan War but also the ethnical distribution of the Macedonian population, was arranged for the purpose of maintaining a so-called balance of power in the Balkans. But instead of achieving this object, the Treaty of Bucharest, favored as it was by Germany, together with the Turco-Bulgarian treaty of Constantinople (September 29, 1913), by which Adrianople and the surrounding country went back to Turkey, and the subsequent distribution of the Aegean islands by the Great Powers, led not to a settlement but merely to a holding in suspense of the numerous Near Eastern questions which had already been the means of shaking the European concert to its very foundation. It was certain that the losses then suffered by Bulgaria would lead her to seize the first opportunity to try to regain the territories which she coveted, either by peaceful negotiation or by war, and it was equally sure that Turkey and Greece would remain on bad terms as a result of the disappointments suffered by both countries in regard to the Aegean islands. It was this situation, together with the rivalry between Austria and Serbia, the disappearance of the Balkan league, and the partial rehabilitation of Turkey under the auspices of Germany that left the way open for and rendered possible the present war.

The Present War

THE ATTITUDE OF BULGARIA: ITS SIGNIFICANCE

The developments in the East since the outbreak of the war may be described as having taken place in three stages. The first is defined by the arrival of the *Goeben* and the *Breslau* at Constantinople and the entry of Turkey into the war. That enemy success, which under the existing conditions could not have been prevented though it might have been foreseen by the Allies, carried with it the immediate acquisition by Germany of a fighting force which was employed to threaten the British in Egypt, Mesopotamia, and Persia and to endanger the Russian position in the Caucasus. But it did not and could not become possessed of its full results until unrestricted communication had been established between Central Europe and the Bosphorus. While the Allies inaugurated the Dardanelles campaign in order to assist Russia and to try to prevent the achievement of this object, the enemy, recognizing the importance of Bulgaria and the attitude of that country towards the Macedonian question, devoted himself to her acquisition at all costs.

From the moment of the outbreak of the war, and particularly during this second stage in Balkan developments, that is the stage intervening between the entries of Turkey and of Bulgaria, the key to the situation in the latter country lay in the fact that King Ferdinand and his Government were determined to utilize the present conflagration in order to try to regain at least some of the losses suffered in 1913. For them this was not so much a European as a third Balkan War for the independence of Macedonia and of the Bulgars, subject to alien, this time principally Serbian and Greek, rule. It was certain, therefore, that they would give no support without the promise of a large section of southern Macedonia and also as a secondary condition the restoration of a section of the Dobrudja and at least part of the then Turkish Thracæ. The bitter antagonism felt by Bulgaria towards Serbia, Greece, and Rumania and particularly towards the first-mentioned country, outweighed the traditional hostility towards Turkey. So long as her future was not adequately secured elsewhere, Bulgaria was unlikely to take up arms against Turkey because her only access to the sea was by way of her Black Sea ports, rendered useless owing to the closing of the Dardanelles, and through Dedeagatch, the railway to which port, according to the Treaty of Constantinople, ran for some miles through Ottoman territory. The great question, therefore, was whether Serbia, Greece, and Rumania would or could be persuaded to restore to Bulgaria areas of territory which she considered should be hers, and whether the Allies would guarantee her possession of districts of now Ottoman territory which they agreed should be allotted to her during the negotiations of the year 1913.

While, so far as I know, no detailed official statement was published on the subject, the conditions required by Bulgaria soon became pretty clear. On the west the Government of King Ferdinand was intent upon the



FIG. 4.



FIG. 5.



FIG. 6.

FIG. 4—The Vardar River at Üsküb.

FIG. 5—Upper valley of the Kriva River, between Egri Palanka and the Serbo-Bulgarian frontier.

FIG. 6—The Serbo-Bulgarian frontier near the headwaters of the Pchinya R. (see Fig. 1).

recognition of the Serbo-Bulgarian treaty of March, 1912, as a basis for discussion. On the south, while claims were made to all the district lying between the Greco-Bulgarian frontier, the Struma valley, and the Aegean, satisfaction would probably have been provided by a rectification of that frontier in such a manner as to give to Bulgaria at least the whole of the Mesta valley and the port of Kavala. On the north, where in 1913 Rumania had claimed, secured, and afterwards seized territory on the south of the Dobrudja, the Bulgarian Government would undoubtedly have agreed to leave to that country the territory, including the town of Silistra, ceded to her by the Protocol of Petrograd in May, 1913, provided the more southerly area, actually seized by Rumania during the second Balkan War, had been restored to its former owners. With regard to the East and in Turkey, as there was obviously no question of negotiation with the Allies, the only feasible arrangement with Bulgaria would have been the giving of a free hand to occupy and retain a part of Thrace, say that situated northwest of the Enos-Midia line, and this I believe was done.

IMPORTANCE OF BULGARIA'S GEOGRAPHICAL POSITION

The enormous war importance of Bulgaria was and is bound up largely with her geographical position. As a result of the Balkan campaigns she became the only state with a frontier contiguous to that of Turkey in Europe and, therefore, the sole country which could attack or through which a land attack could be made upon the European dominions of the Sultan. Equally well, it was by way of Bulgaria alone that officers, technical experts, and supplies could be sent, as they were sent, from Central Europe to Constantinople. Owing to her central, or interior, position the value of Bulgaria was, therefore, out of all proportion even to the high fighting efficiency of her military machine. The position was important to both groups of Powers, but it was Germany who, realizing the necessity of preparing the way for action from the first, left no stone unturned to develop an already advantageous situation in order at least to maintain the neutrality and, if possible, to secure the support of Bulgaria and in the end wrung from Turkey concessions of the greatest value to the Government of King Ferdinand. These concessions, which took the form of the cession by the former country of the area of Thrace along the Maritza River through which the railway runs from Mustafa Pasha to Dedeagatch—an area now reported to have been given back to Turkey—were sanctioned by a preliminary agreement arrived at in July.

The position of the Allies, originally more difficult, gradually became far more complicated than that of the enemy. To begin with there was always Russia in the background, who, while supporting Serbia on the one hand, was regarded with actual suspicion by Bulgaria on the other. Moreover, where Germany was able to negotiate with one country, Turkey, for concessions to Bulgaria, it was necessary for England, France, Russia, and

later Italy to approach Serbia, Greece, and Rumania, against all of which countries the Government of Sofia had far-reaching claims. Consequently, when tardily and too late the Allies recognized the importance of Bulgaria, the ground for negotiation was extremely unfavorable, and that country had already set a price upon herself which it was far from easy to pay.

The Saloniki Campaign

The direct result of the Macedonian complications and of their non-resolution by the Balkan Wars was therefore the entry of Bulgaria into the theater of hostilities, accompanied as it was by the inauguration of the Saloniki campaign. This campaign has been partly responsible for preventing the adhesion of Greece to the side of Germany during the reign of King Constantine, and it has prohibited the enemy from establishing many all-important submarine bases on the Aegean coast, results which themselves justify it. The restriction of its development may in large measure be attributed to the strategically favorable offensive and defensive positions of the enemy.

THE STRATEGIC POSITION OF BULGARIA

In considering the first of these conditions, that is the offensive, it must always be remembered that the western frontier of Bulgaria runs practically due north and south and follows a line more or less parallel to but to the east of the great natural highway through the valleys of the Morava and the Vardar. These valleys, constituting the heart of Serbia and traversed by the all-important Nish-Saloniki railway, were open to attack by Bulgaria at several points. While in certain districts the distance to be covered on Serbian soil was about 60 miles, in others it was much less and in one place (just to the southeast of Demir-Kapu in the Vardar valley) the frontier approaches to within about five miles of the railway. Moreover the Bulgarians, who have always prepared for war not only by the training of an efficient army but also by the provision of effective communications, were possessed of roads and railways which enabled them rapidly to collect troops and to push them across the Serbian frontier. For instance, in addition to the main line from Sofia to Nish, there were the railways which run to Vidin and Berkovitz in northwestern Bulgaria and the line to Gyuveshevo on the frontier between Sofia and Üsküb. These lines, together with the available roads which cross the frontier and particularly with that which follows the valley of the Struma (down the greater part of which a railway has now been constructed), enabled the enemy rapidly to advance by numerous different and independent routes and to secure possession of the Vardar valley before the Allies could fight their way up into Serbia and before the army of that country was able to make good its retreat in a southerly direction. It was these facilities which forced the Serbs to retire towards the Adriatic instead

of towards the Aegean, which latter alternative, had it been feasible, would have been much easier and far less costly.

On the north and east of Saloniki, western Bulgaria is shut off from the Aegean by a strip of Hellenic territory annexed by Greece after the Balkan Wars. Measured from the Vardar valley on the west to the Greco-Bulgarian frontier on the east, it has a length of about 115 miles. Its average breadth from south to north is about 50 miles. Containing the port of Kavala and the towns of Drama, Seres, and Demir Hissar, a large proportion of this section of country, in addition to being strategically



FIG. 7—A street in Monastir.

important, is also rich. The Bulgarians, who, for these reasons, desired to reconquer it, were also favorably placed for the accomplishment of their object. They already held the Rhodope Mountains lying to the north and northeast, and they had an excellent line of advance by way of the Struma valley and a secondary means of communication by the Mesta valley route.

On the other hand the geographical and political conditions, which have been and are entirely against the Allies, are therefore favorable to the Bulgarians from the defensive standpoint. Passing over the difficulties of transportation, the lack of port facilities, and the original inadequacy of the roads and railways, this is largely due to the fact that the Allies' lines of advance into the interior are strictly limited. The enemy seized the greater part of the Vardar valley, which constitutes the only natural way into the interior, early in the campaign. For the Allies to drive him back

and to fight their way up this valley would have been a matter of the utmost difficulty inasmuch as the valley is narrow and very easily defensible.⁴

THE POSITION AT SALONIKI

In the summer of 1916, when it was decided to put an end to the passive defense of Saloniki, two alternatives were open to the Allies—to endeavor to push forward either on the east or on the west of the Vardar. In the former area the principal feature affecting the relations of Saloniki to the interior and governing the direction of an advance from the Aegean coast



FIG. 8—The principal street in Saloniki.

into the heart of Old Bulgaria is the Rhodope Mountains, which extend from the Struma valley on the west to the Maritza River on the east. The western and central portions form one more or less definite line, but on the east this line divides into two long offshoots which enclose the valley of the Arda. The elevations attained at the western end of the range are considerably greater than those at the east. While in the former district there is the Mus Alla Peak (9,500 feet), situated a few miles to the east of the Struma valley, in the latter we have nothing higher than the Karlük Dagħ (6,200 feet), located a few miles to the northwest of Gümürdjina. In order to penetrate the Rhodopes from the south it would be necessary either to approach and to occupy the plain which borders the Aegean from the west and therefore from the direction of Saloniki or to effect a fresh landing

⁴ See D. W. Johnson: *The Balkan Campaign*, *Geogr. Rev.*, Vol. 2, 1916, pp. 27-47; especially pp. 43-44.—
EDIT. NOTE.

somewhere along the coast between that port and Dedeagatch, immediately west of the Maritza mouth. The former operation would be a dangerous one and one requiring a large force, for it would entail an advance by way of the Saloniki-Dedeagatch railway, which runs practically parallel to the front the enemy would undoubtedly establish more or less along the line of the Rhodopes. Fresh landings on the other hand would not only be beset by the heavy losses and the enormous difficulties which always go with such undertakings, but they would also be accompanied by dangers due to the fact that, except at Kavala, which has now no doubt been strongly fortified by the enemy, good landing places are not available.

The Allied commander therefore rightly decided not to attempt such an advance and chose for his push into the interior the section of country located to the west of the Vardar valley and lying more or less between Saloniki and Monastir or between the former town and the southern part of the Albanian frontier. The geographical and other conditions obtaining here have been and are in some ways more and in some ways less favorable to the Allies than are those existing on the other side of the Vardar. On the one hand, while there are the Moglena and other mountains on the Greco-Serbian frontier and while the country to the north and northeast of Monastir is very difficult, there are no barriers lying to the south and southeast of that town which compare in their strength to the Rhodope Mountains. Moreover Saloniki is connected with Monastir by a road and a railway. The road approximately follows the railway, which crosses the plain to Verria, where it begins to enter the hills. This line is of very great importance, not only because it gives access to Monastir, but because it runs more or less parallel to the Allied front.

So much for the favorable conditions in this area. From the opposite point of view it was here, during the period of her uncertainty, that the attitude of Greece so greatly complicated the Allied plan of campaign. On the east of the Vardar and in the Greek district enclosed by that river, the Rhodopes, the Bulgarian frontier, and the Aegean, there was the danger that the Greek forces would make no effort to resist an enemy advance. This indeed was what actually happened, but their strength was known and the sacrifice of that territory was not vital to the whole Allied position. Not so, however, with the area to the south of Monastir and to the west of Saloniki. There the facilities possessed by Greece for an advance against the left rear of the Allied position were such that had King Constantine thrown in his lot with the enemy, he was in a position so favorable as to enable him to jeopardize the entire British and French plan. Until the situation in Greece had been got in hand, therefore, these dangers prevented the inauguration of a plan which, up to the present, has only led to a more or less local success in the capture of Monastir. Yet it has none the less achieved important military and political results in that it has been the means of effecting the union of the Allied armies based on Saloniki



FIG. 9.



FIG. 10.

FIG. 9—A scene in the eastern Rhodope Mountains.

FIG. 10—The railway in the Vardar valley at the Demir Kapu gorge. This line is part of the through route from Central Europe to Saloniki.

with the forces of Italy landed on the Adriatic coast and in that it has wrested from Bulgaria a town whose political importance is unequalled elsewhere in Macedonia.

The Future of Macedonia

While it is impossible to forecast what may be the future of the Saloniki campaign, it is apparent that Bulgaria has conquered from her neighbors (except Turkey) and especially from Serbia the districts which she claimed and in some cases much more than she claimed prior to her entry into the war. In spite of this the future ownership of Macedonia depends not so much upon its present occupation as upon the general though not necessarily Balkan victory which will ultimately be won by the Allies and upon the distribution of territory then to be decided upon by them. The great question, a question which must be studied in advance, is therefore bound up with the solution of a problem which, if it be not settled as a result of the present war, will still endanger the peace of the world.

The Allies might decide to try to effect such a settlement by agreeing to continue the war not only until they were in a position to impose their terms upon the Central Powers, but also upon their smaller allies. So far as the Balkans are concerned, in addition to giving to Serbia and to Rumania those areas of Austria-Hungary which should undoubtedly be theirs, the adoption of this course would probably carry with it the practical disappearance of Bulgaria and of Turkey in Europe from the map, and it would mean the enormous enlargement of Serbia, Greece, and Rumania. In Macedonia this would mean the reversal of the policy of the principle of nationalities or of government with the consent of the governed. It would once more constitute not a settlement, but merely a holding in suspense of the settlement of this all-important problem. Hence we are compelled to look for an alternative carrying with it justice to all the Balkan nationalities and therefore the real establishment of peace—peace which in itself will go a long way to constitute an anti-German barrier in the Near East. The chief question to be decided is the true nationality of the peoples inhabiting doubtful or disputed areas.

In the case of Macedonia, and particularly so far as it concerns Serbia and Bulgaria, there are three ways in which the question of nationality can be settled—according to language, by taking a plebiscite, or upon the basis of a Serbo-Bulgarian treaty. If the first of these means were chosen the necessary measures would have to be taken to ascertain the areas of Macedonia in which the forms of speech particular to Bulgarians or Serbians are employed. Among the contributions to this question the information given by the Serbian "Balkanicus" in his book, "The Aspirations of Bulgaria,"⁵ is most important, for he admits the post-position of the article in the Macedonian dialect. Though the author endeavors to

⁵ Translated from the Serbian, Simpkin, Marshall, Hamilton, Kent & Co., London, 1915; reference on p. 222.

explain away this fact, his evidence is conclusive, for Bulgarian is the only Slav language in which the article is post-fixed.

In theory the taking of a plebiscite would be a satisfactory manner of arriving at a solution of the question: in actuality difficulties would arise. To enable the people to vote freely, a plebiscite could only be conducted under the direct auspices of the Allies or, better still, under the control of America. In such circumstances it is probable that the Serbians would lose heavily. If proof of this contention be required, it can be found in the various concessions made by the ex-Sultan Abdul Hamid and his prede-



FIG. 11—Bulgarian peasants on road approaching Küstendil.

cessors to the Bulgarian Exarchate; for the Turks have never admitted the jurisdiction of any Church in areas in which its members did not constitute an overwhelming majority of the population.

The third and last suggestion for a solution of the Macedonian question seems to be the one by far the simplest and fairest of adoption. It is the simplest because the Serbo-Bulgarian treaty of 1912 and its annex were arranged by the two contracting parties, without foreign interference, only six years ago and when the question was looming not in the distance but at a moment when a redistribution of territory was actually foreseen. To take that agreement as the basis for, though not necessarily the actual text of, a future arrangement would be the fairest settlement of the problem. It allots to Bulgaria far less than she would have got from the Treaty of San Stefano: the Serbians would probably secure from it a settlement much more favorable to them than any which could result from the language basis or from the taking of a plebiscite under the conditions

which I have indicated. Moreover under it there might be autonomy for the disputed areas.

There are questions connected with the future ownership of parts of Greece and of Rumania now occupied by Bulgaria. In regard to those areas annexed to Greece after the wars of 1912 and 1913, it must always be remembered that Venizelos was at one time in favor of the concessions necessary to secure the support of Bulgaria and that the Government of King Constantine, in opposition to the wishes of the Allies, voluntarily sacrificed large tracts of country to Bulgaria. The delimitation of the Rumano-Bulgarian frontier of the Dobrudja, of the Turco-Bulgarian frontier in Thrace, and of the boundaries of Albania would also be possessed of difficulties. But here again there are treaties or arrangements which might be taken as a basis for future territorial distribution. In the first case there is the agreement made between Rumania and Bulgaria by the Protocol of Petrograd: in the second there is the Treaty of London, which fixed the Enos-Midia Line as the European frontier of the Ottoman Empire, and in the third there is the European decision creating and bounding Albania—a decision which, while it should be modified in detail in favor of that country, none the less constitutes a groundwork for the future.

THE TURKS AND CAICOS ISLANDS, BRITISH WEST INDIES

By THEODOOR DE BOOY

The Turks and Caicos Islands, geographically, form a part of the Bahamas, which may be considered to extend from off the Florida coast to Navidad Bank, north of the eastern end of Haiti. Of the banks and islands resting on a submarine platform which constitute this island chain, they represent the last that rise above the surface of the sea. Beyond, to the southeast, lie three banks, the first two, Monchoir Bank and Silver Bank, in part awash, the last, Navidad Bank, entirely submerged. While accurate data are not available to prove that these three banks are being uplifted, the mere fact that the Caicos Island Bank and many other banks in the Bahamas themselves are constantly building up, warrants the conjecture that the same tidal and geological conditions govern them all and that in the course of time three additional island groups will come into being.¹

SETTLEMENT AND HISTORY

The Turks and Caicos Islands owe their existence as a British colony to the salt ponds that are found upon the two principal keys of the group. It is probable that the archipelago was discovered within a short period after the coming of the *conquistadores* to the Americas.² The Indian population of the islands was carried off to slavery in the mines of Santo Domingo and suffered a fate similar to that of the inhabitants of the other Bahama Islands. The archeological researches conducted by the writer on the Turks and Caicos Islands demonstrated that the Turks Islands proper were not inhabited by the Indians, but that the Caicos Islands group supported a large pre-Columbian population.³ This is not surprising when one considers the total lack of agricultural possibilities of the eastern group.

From the time of their discovery until the year 1678, the Turks and Caicos Islands appear to have been so little thought of that no nation saw fit either to claim or colonize them. In that year a party of Bermudians

¹ For a general discussion of the geology of the Bahamas see "The Bahama Islands," edit. by G. B. Shattuck and published by the Geographical Society of Baltimore, 1905, with excellent bathymetric map (Pl. X, facing p. 52); also T. Wayland Vaughan's numerous papers, more especially: Preliminary Remarks on the Geology of the Bahamas, etc., *Carnegie Inst. Publ. No. 182*, pp. 49-54.—EDIT. NOTE.

² Oviedo ("Historia General y Natural de las Indias," Madrid, 1851 edition, Bk. 19, Ch. 15) enumerates the islands to the northwest of Porto Rico, after relating the voyage made by Ponce de Leon to Bimini and Florida (1512), and names the Babueca Islands as the first group one would meet with. The "Baxos de babueca" are prominently shown on the Wolfenbüttel-Spanish map, drawn between the years 1527 and 1530, and are shown as the southeasterly termination of the Islas de los Lucayos, i. e. the Bahamas (E. L. Stevenson: Early Spanish Cartography of the New World, *Proc. Amer. Antiquarian Soc.*, N. S., Vol. 19, 1909, pp. 369-419; reference on p. 380). It is therefore more than likely that the aboriginal name of the group was Babueca. The name Babueca appears on the Waldseemüller map of 1516; it is applied to a large island northwest of Hispaniola.

³ Theodoor de Booy: Lucayan Remains on the Caicos Islands, *Amer. Anthropologist*, N. S., Vol. 14, 1912, pp. 81-105.

came to the Turks Islands to establish salt ponds where they could "rake" this commodity in order to supply the needs of the colony.⁴ These settlers did not occupy the Caicos Islands but confined their attention solely to the

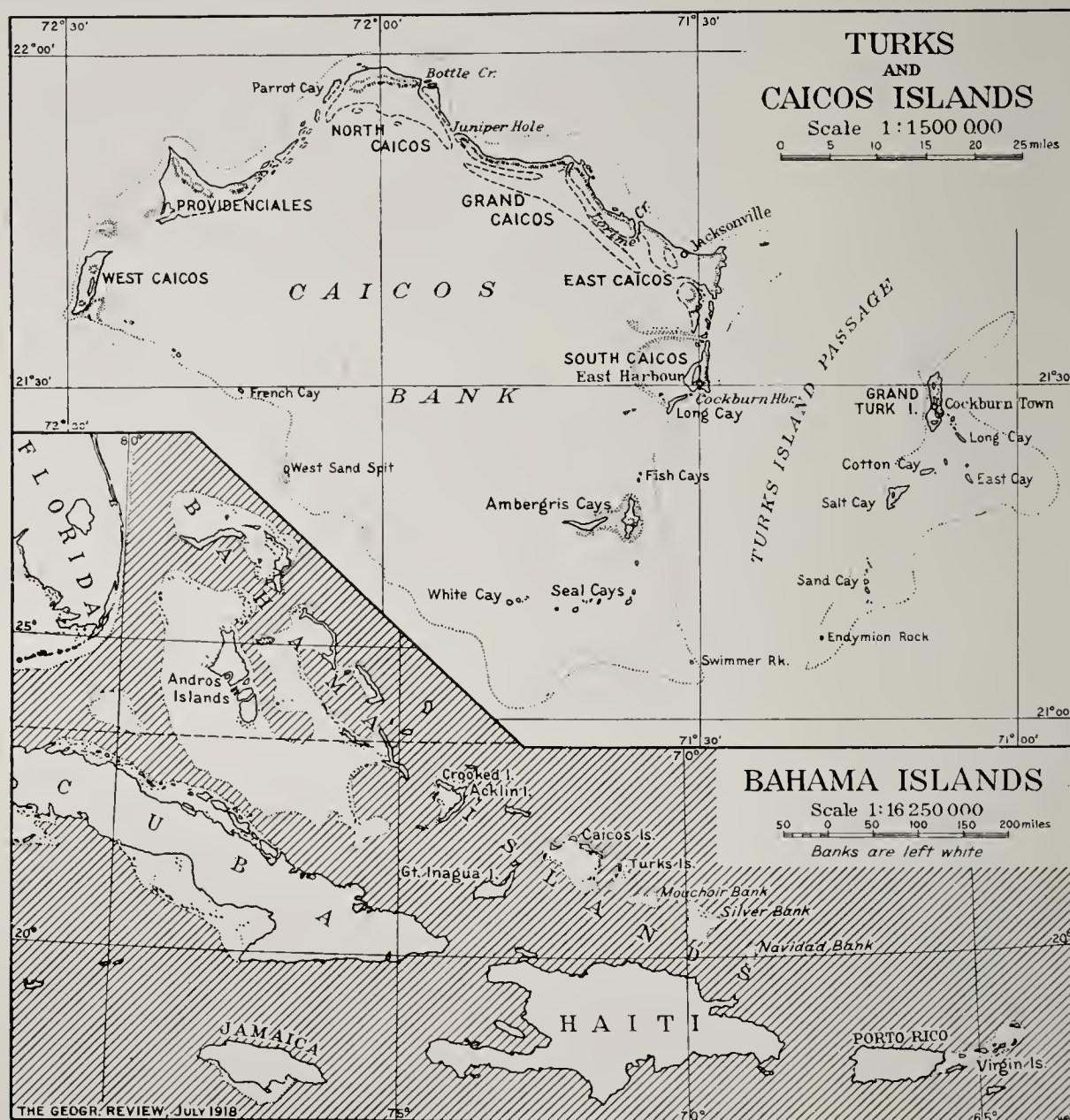


FIG. 1—Map of the Turks and Caicos Islands based on U. S. Hydrographic Office Chart No. 948 (June, 1915). Scale, 1:1,500,000. The inset shows the general location of the group and their relation to the Bahama Islands.

ponds they built on Grand Turk and on Salt Cay, coming here every year from March to November.

After building their ponds and establishing themselves, the Bermudians on the Turks Islands attracted the attention first of the Spaniards of Santo Domingo, who attacked them in 1710, and afterwards of the French in Haiti, who captured the islands in 1753 and again in 1764.⁵ From 1764 on the

⁴ F. H. Watkins: Report on the Salt Industry of the Turks and Caicos Islands, *Misc. Colonial Repts.* No. 56, London, 1908, p. 6.

⁵ J. H. Pusey: The Handbook of the Turks and Caicos Islands, Kingston, Jamaica, 1897, p. 18.

Turks Islands have remained in undisputed possession of the British Crown. A direct result of the French invasions of the Turks Islands was the fact that the attention of the home government was drawn to the strategic importance of these hitherto unnoticed islands. In 1766 the Turks Islands were formally placed under the jurisdiction of the Bahaman government, it being justly urged that the southeasterly group was a geographic part of the larger archipelago. But in reality the two island groups had little in common. Legislation was conducted in the interests of the agricultural Bahamas: on the salt-producing Turks Islands the burdens of taxation fell heavily and with little compensation. Moreover, administration from Nassau labored under the disadvantage of poor communications, for winds and currents make navigation difficult between the groups.⁶ In 1848, the Turks and Caicos Islands—the Caicos Islands by this time being a recognized part of the colony—were authorized to govern themselves, under the supervision of the Governor of Jamaica. From 1848 until 1874 the islands were controlled in this manner. The local method of governing did not prove a success, however, for the little colony was unable to support itself from the revenues derived from export taxes on salt. In consequence, on January 1, 1874, the Turks and Caicos Islands were formally declared to be a Crown Colony and a dependency of Jamaica, which status they have retained until the present day.

While the Turks Islands were from the first used solely for the exploitation of the salt, the Caicos Islands owed their settlement to the American War of Independence and to the agricultural establishments of the Loyalist refugees to whom lands had been granted there after the loss of their holdings in Georgia. These refugees, together with their numerous slaves, devoted their efforts exclusively to the raising of cotton. Successive hurricanes, and especially the great hurricane of 1813, together with the havoc wrought among the cotton plants by a destructive insect, put an end to the prosperity of the planters and caused the agricultural establishments to be gradually abandoned during the first twenty years of the nineteenth century. Shortly after this, the salt ponds of East Harbour, on South Caicos, were constructed, and it was speedily discovered that East Harbour would soon overshadow the other salt-producing settlements of the dependency.

The Turks Islands

As the Turks and Caicos Islands really consist of two distinct groups, separated by a 21-mile passage, it may be best to discuss the character of each group separately.

The Turks Islands group consists of the two larger and inhabited keys, Grand Turk and Salt Cay, four uninhabited keys and a large number of rocks. A three-pointed bank surrounds the group and offers serious dangers

⁶ J. M. Wright: *History of the Bahama Islands, etc.*, pp. 419-583 of first work cited in footnote 1.



FIG. 2.—View of Cockburn Town, Grand Turk Island, from the east.

to navigation. This bank has been the scene of a large number of shipwrecks. The islands derive their name from the Turk's head cactus, a globular green plant surmounted by a scarlet head resembling the Turkish fez.

GRAND TURK

The island of Grand Turk, with a population of 1,681,⁷ of whom not less than 1,400 are of African descent, has an area of about eight square miles. The only settlement on Grand Turk, Cockburn Town, is situated on the western coast and contains practically the entire population. There is no harbor, and visiting vessels are obliged to anchor in an open roadstead and to remain a considerable distance off shore. In the stormy seasons not only does the exposed anchorage present grave dangers but the lightering of cargo becomes at times impossible. All freight is brought off to ships in lighters, for which two small piers are provided on the water front. At the present time but one steamship company calls at the island, although occasional freighters and sailing vessels come to load salt.

Grand Turk itself is one of the bleakest and barrenest islands imaginable. Its desolation is exceeded only by that of its neighbor, Salt Cay. The greatest elevation on Grand Turk is but 70 feet. Naught but the dwarfed shrub typical of the Bahamas is seen here, and such few trees as raise their disconsolate heads above the landscape have a dejected leaning towards the west, caused by the unceasing easterly trade winds. Of late the northern coast of Grand Turk has been utilized for the planting of sisal; but beside these plants, which seem to feed on nothing and yet produce leaves, no agriculture of any kind is found. Aptly enough the Turks Islands have been named the land of "salt, sand, and sorrow."

The climate of Grand Turk is good, the mean temperature being 82° F. Tempered by the constant ocean winds, the days are not oppressively warm. It is interesting to note the prevalence of the easterly winds. The winds recorded in 1916 were: north, 10 days; northeast, 72 days; east, 199 days; southeast, 51 days; south, 19 days; southwest, 2 days; northwest, 7 days; calm, 2 days.⁸ The rainfall for the same year, which was near the average, was 26.37 inches. There are no fresh-water ponds or wells on the island, and the inhabitants have to depend entirely upon the rain-water tanks with which each house is provided.

A cable connects Grand Turk with Bermuda, Jamaica, and Halifax; and in consequence a number of steamers bound from England to Jamaica make a practice of passing close to the island in order that the lighthouse keepers may make out their signals and house flag and report them to the resident Lloyd's agent, who in turn cables the information to the owners in Great

⁷ A. E. Aspinall: *The Pocket Guide to the West Indies*, London, 1914, p. 202. See also his "West Indies and Guiana: Six Lectures Prepared for the Visual Instruction Committee of the Colonial Office," London, 1914, p. 29.

⁸ *Turks and Caicos Islands, Ann. Colonial Repts. No. 927*, London, 1916, p. 7. The deficiency of 3 days in the total for the year is probably due to a typographical error.

Britain. The cable company receives a small subsidy from the Turks Island government in exchange for a daily news bulletin.

THE SALT INDUSTRY

There are two means by which the Turks Islands laborer can make a living. In the first place, he can hire himself out as a stevedore upon the ships of the Clyde Steamship Company which call at the island in order to procure men for the loading and discharging of freight in Dominican ports. Failing this, the Turks Islander finds work in the various operations of salt making. There are 230 acres of salt ponds on Grand Turk. As the *raison d'être* of the Turks and Caicos Islands is the production of salt and the very life of the colony depends upon this industry, it may be considered fitting to give a brief account of its principal operations.⁹

Salt ponds vary in size and are sometimes as large as five acres, while the pans are from one quarter of an acre to an acre in extent. The sea passes through sluices, entering by wide canals into the common storage reservoirs and then into the private reservoirs. The water now goes to the "weak or No. 1 pond" until the salometer indicates 60. In this pond a great deal of the impurities are precipitated, and the water turns a saffron hue. By the time the brine has reached the strength of 60, the water has been reduced in quantity more than one half of the original sea water, and it is now passed into the "strong or No. 2 ponds."

The brine stays in this latter pond for about twenty days, until the strength of the pickle has increased to 90. The pickle is now pink in color and but one-sixth part of the original sea water. Having reached a strength of 90, it is turned into the "making pans," where, after ten to fifteen days, the salt commences to granulate around the margins and bottoms of the pond. After twenty to twenty-five days more the salt is ready to be raked.

When all the salt has crystallized in the pans, it is gathered by men who first use toothed rakes for the separation of the crystals and afterwards wooden rakes to deposit the salt in small piles.

The average quantity of salt raked annually from an acre of pans at Grand Turk and East Harbour may, under favorable circumstances, be estimated at 4,000 bushels; at Salt Cay, where the pans are shallow, at 5,000 bushels.

Under average conditions the salt-pond proprietors can count upon a fair return from their holdings. But when the season is rainy vast quantities of the forming salt in the ponds are destroyed, and a large percentage of the deposits where the product is stored in enormous heaps literally wastes away. The average yearly rainfall is about 24.5 inches, and when this figure is exceeded (as it was from 1903 to 1905, for which years it averaged 40.80 inches) the results are disastrous to the proprietors. According to the authority quoted above, the average annual export of salt

⁹ Summarized from Watkins, paper cited in footnote 4.



FIG. 3.



FIG. 4.

FIG. 3—The salt ponds, Grand Turk Island.

FIG. 4—Filling salt for shipment, Grand Turk Island.

during the period from 1888 to 1907 was 1,630,314 bushels, of which 77.6 per cent went to the markets of the United States and 16.1 per cent to Canada. The salt is of exceptional purity and is in great demand for packing purposes. In 1916 the export of salt from the dependency was valued at about \$100,000, forming nearly three-quarters of the total exports.

SALT CAY AND OTHER KEYS

Salt Cay, the next largest island of the Turks Islands group, has a population of 398 and depends entirely upon the salt ponds, 120 acres in extent, for its existence. It is even bleaker and barrenner than Grand Turk, and one wonders at the monotony of the lives of the few white inhabitants living here. The area of Salt Cay is about five square miles; its highest elevation is a 60-foot bluff on the northwestern extremity.

The remaining keys are uninhabited and have but little claim upon our notice. East Cay has an elevation of 96 feet and is the loftiest island of the entire group. Numerous rocks and shoals form part of the group and tend to make interinsular navigation a hazardous matter. Of these obstructions Endymion Rock recalls the loss of the British man-of-war *Endymion* in 1790.

The Caicos Islands

The Caicos Islands group is separated from the Turks Islands by a 21-mile passage, known as the Turks Island Passage. For small vessels this passage presents grave dangers. The seas are apt to run high, and the currents, which at times attain a rate of three knots,¹⁰ are uncertain and variable, occasionally running northeast and at other times southwest. On approaching South Caicos Island a long land swell is experienced off Highland Point, which in stormy weather is responsible for the loss of many a local sloop.

CAICOS BANK

The Caicos Islands surround the Caicos Bank, which has a triangular shape, the northern side being 58 miles long, the eastern side 39, and the western 56. The northern and eastern sides of the bank are bounded by a chain of narrow islands, while the western side is represented by a series of reefs and rocks. There can be no doubt that the bank will, in course of time, become one large island. Its interior is already represented by a low, salty plain, barely above sea level. An example of a bank that has grown up in this manner is seen directly to the westward, where Great Inagua Island presents every evidence that it originally consisted of a bank surrounded by reefs and keys. The interior of Great Inagua is a level, swampy savana, a casual inspection of which convinces the investigator that not many centuries ago the entire area was submerged. Another example of

¹⁰ West Indies Pilot, Vol. 1, *U. S. Hydrogr. Office [Publ.] No. 128*, Washington, 1913, p. 198.

an island in the making can be seen to the northwest, where Crooked Island, Acklin Island, and Fortune Island surround the Acklin Island Bank. This bank is yearly becoming shallower and in time will merge with the three islands.

ITS SHOALING

All evidence points to the constant shoaling of the Caicos Bank. Historical accounts of the pursuit of piratical craft across the bank by men-of-war in the eighteenth and the early part of the nineteenth century indicate that even a hundred years ago deep channels existed where today a vessel drawing but six feet of water has to proceed with caution. A channel across the southern part of the bank, reported to be 14 feet deep in 1881, was followed by the writer in 1912 in a vessel drawing $6\frac{1}{2}$ feet. Soundings made at that time showed the channel to have shoaled to such an extent that in places barely 9 feet of water was found. The creeks dividing the islands from Grand Caicos to South Caicos are fordable, and a man can proceed afoot from the one island to the other. Yet it is within the recollection of the older inhabitants that vessels of good size could reach the inner waters of the bank by passing between any two of the islands lying within the described limits. The entire range of islands from South Caicos west to West Caicos is fringed by a highly dangerous coral reef, lying from half a mile to two miles off shore. Occasional openings in this reef allow the mariner to anchor off the northern shores, but only in calm weather do these berths offer any security. A curious phenomenon, which probably accounts for the constant upbuilding of the Caicos Bank, is the indraft into the bights which is felt for a distance of from five to six miles out at sea and is a grave source of danger to a becalmed sailing vessel.¹¹ Juniper Hole, between Grand Caicos and North Caicos, bears an especially bad reputation in this respect and in consequence is shunned by local boats. Experienced boat handlers of the Caicos state that the smaller sailing craft, when they are becalmed, are literally drawn toward the rocks fringing this particular inlet and dashed to pieces. It appears to be well within the bounds of reason to suppose that this indraft carries enormous quantities of sand from the Atlantic, through the interinsular channels, to the bank itself and is in consequence responsible for the constant shoaling of its waters. The surrounding coral reefs act as traps to prevent the washing away of the deposits, and, as these reefs are also constantly being built up by the activities of the coral polyps, it will be seen that every indication points towards the probability of island growth. It must be stated that these phenomena do not account for the original formation of the Caicos Islands themselves. This may have been due to uplift, judging from the waterworn caves found in the limestone ridges throughout the keys.¹²

¹¹ West Indies Pilot, Vol. 1, p. 189.

¹² Compare, however, the section on Physiography and Geology by G. B. Shattuck and B. L. Miller in the first work cited in footnote 1.—EDIT. NOTE.

POPULATION AND INDUSTRIES

Except by government officials, who are obliged to make periodic inspection trips, the Caicos Islands are but seldom visited and remain comparatively unknown. The literature pertaining to them is almost negligible. Even the origin of the name remains unknown, although local accounts intimate that Caicos was derived from the Spanish word *cayos* (keys, little islands). The area of the islands is about 151 square miles, although accurate surveys of the islands and more especially of the inner shore lines have never been made. The population amounts to 3,536 souls, of whom fully 95 per cent are of African descent. The greater number of the inhabitants live on South Caicos and on East Caicos, where the salt and the sisal industries provide work for numerous laborers. The climate is practically the same healthful climate as that of the Turks Islands. There are, however, certain localities on North Caicos where the inhabitants suffer a good deal from malarial fever. As on Grand Turk and Salt Cay lack of water is the principal drawback, and the population here also has to depend entirely upon rain water stored in tanks.

SPONGES

Despite the fact that some of the Caicos Islands have decided agricultural possibilities, the majority of the inhabitants make their living off the sea. At one time the Caicos Bank was famed for the quantity and the quality of sponges that grew in its shallow waters. Owing to a shortsighted policy on the part of the government, which allowed these marine growths to be fished at all seasons, they have practically become exhausted; whereas in 1901 sponges were shipped to the value of over \$44,500, exports of sponges in 1916 amounted to only one-ninth as much. Of late years efforts are being made to grow marketable sponges from clippings on concrete disks. These attempts are carried out in two of the creeks on the islands of Providenciales and South Caicos and from all indications ought to prove a success. A "live" sponge is cut up into small pieces the size of a walnut. These pieces are then fastened to a concrete disk and placed in the water. In three or four years a sponge of marketable size has grown from the clipping and can be detached from the disk. Sponges produced by this method have the advantage of not needing to be "clipped," i. e. the part of the sponge where it was attached and where small particles of coral have become imbedded in its growth need not be removed with shears. Furthermore, in growing sponges by this method, it becomes possible to select only the more valuable varieties for propagation, such as the reef sponges and the sheep's-wool sponges.

CONCHS

The conch (*Strombus gigas*) is found in large quantities in the waters surrounding the Caicos Islands. Not only does this animal form a staple



FIG. 5.



FIG. 6.

FIG. 5 Sisal fiber being dried on a series of low walls made from coral rock, East Caicos Island. Flamingo Hill in background.

FIG. 6—Field of sisal plants and warehouse, East Caicos Island.

in the dietary of the inhabitants but it is also extensively exported to the neighboring island of Haiti, where the sun-dried meat is in great demand. In 1916 dried conch meat to a value of some \$8,000 was exported. The lips of conch shells have always been in great demand in the cameo-cutting trade, owing to the contrast between the white, outer and the pink, inner shell. Until lately it was customary to ship the entire shell of the animal, the purchaser having to cut off the lip and throw the rest away. For the last few years the cutting up of the shells has been done locally, thereby effecting an immense saving of space in the shipments. A not inconsiderable revenue is derived from these sources. The conch also occasionally produces pearls which are sold at good prices.

OTHER INDUSTRIES

Salted and dried fish are consumed locally and exported to Haiti and to Santo Domingo. Turtles are caught in the waters surrounding the keys but are used mostly for local consumption, since laws were passed in the United States requiring that turtles be shipped in tanks instead of on their backs as was formerly done. The spiny lobster (*Palinurus vulgaris*) is abundantly found on the rocky shoals of the Caicos Bank, and a small cannery at Chalk Sound on the island of Providenciales exports a limited quantity of this sea food.

The two principal exports from the Caicos Islands are salt and sisal. As has been stated, the methods in vogue for the production of salt on South Caicos do not differ materially from those employed on Grand Turk and on Salt Cay. The ponds of South Caicos, with an area of 400 acres, are larger than those of Grand Turk and of Salt Cay combined. Practically all the sisal fiber exported from the dependency comes from the large plantation on East Caicos. The value of the exported product amounted to nearly \$16,000 in 1916, and it is believed that the value of the exportation in 1917, owing to the increased price and to a better crop, greatly exceeds this figure.

Efforts are being made by the local government to encourage the growing of cotton on the Caicos Islands. Soil and climatic conditions are excellent for this purpose, and the cotton raised in past years is one of the highest-priced varieties on the market. Since modern science has found means to combat the injurious insects which prey upon the plants and which in the past were responsible for the failure of the Loyalist refugees, it is quite possible that several of the Caicos Islands may find their agricultural salvation in this manner. In fact, it is thought by some that the possibilities offered by cotton cultivation on these islands are unlimited and that in time the cotton industry may overshadow the somewhat uncertain salt industry.

SOUTH CAICOS ISLAND

South Caicos is the seat of government for the Caicos Islands group and possesses the largest settlement, called in official parlance Cockburn Har-

bour, though generally known and referred to as East Harbour. The settlement has a fairly secure anchorage for large vessels between South Caicos and Long Cay and in consequence possesses a decided advantage in this respect over Grand Turk or Salt Cay. East Harbour has a population of about 1,200 inhabitants. The highest elevation on South Caicos is about 110 feet. The island depends entirely upon its salt industry and is barren and unproductive.

EAST CAICOS ISLAND AND ITS SISAL CULTIVATION

East Caicos is exclusively devoted to the raising of sisal plants and the production of fiber. The main settlement of the East Caicos Fibre Company, which has over 3,000 acres in cultivation, is found at Jacksonville, on the northern coast. The estate employs several hundred laborers, who come from all parts of the Caicos Islands to find employment. A mule-drawn railway for transporting the sisal leaves connects the factory with the fields.

Sisal plants (*Agave regida*) were introduced many years ago in the Bahamas, probably from Yucatan, as the Bahamas and the Caicos Islands sisal is the same as the well-known henequen from the latter region. The barren Bahamas and the Caicos Islands are ideally fitted to produce sisal. This plant flourishes on soil that is dry and rich in lime; it does better on poor soil than on fertile. In fact, the poorer the soil, the longer the life of the plant. Where a plant will "pole," i. e. grow its flower stalk (with which its productivity ends) after but three years on fertile land, this "poling" will be delayed in plants grown on poor soil. In consequence, the harvest of leaves cut from the plants will be perhaps five times as large. From the Bahamas the sisal plants were first introduced on West Caicos, where an English company leased land from the government and erected a factory. For various reasons this factory failed. The plantation on East Caicos was started in 1882 and possesses up-to-date machinery for the extraction of the fiber. The leaves, from three to six feet in length, are cut periodically, and special decorticating machinery extracts their white fiber. This fiber is then carried to a series of low walls, built of coral rocks, where it is dried in the sun. Once dried, the fiber is baled under hydraulic pressure and shipped to foreign markets, where it ultimately is made up into rope, binder twine, etc.

There is an exposed reef-harbor at Jacksonville, where the local boats find a fairly secure shelter. The highest elevation on the island is Flamingo Hill, 270 feet high.

GRAND CAICOS ISLAND

Grand Caicos is the largest island of the group. There are two settlements on the eastern side of the key, Bambara and Lorimers, while the fishing villages of Conch Bar and Ferguson's Point are found on the north-western point. These settlements are not large in extent and consist of collections of miserable huts. The inhabitants eke out a precarious exist-

ence by fishing and agriculture. It is doubtful if more than 200 people live on this unproductive key.

NORTH CAICOS ISLAND

North Caicos is the most fertile of the Caicos Islands group, and timber is found on it of sufficient size for building small local sailing vessels. Agriculture provides the inhabitants with a living, and the larger part of the products raised are shipped to South Caicos and Grand Turk. Nevertheless the people are miserably poor and not infrequently have to apply to the government for relief. A number of settlements are found on Bottle Creek, the inlet separating Grand and North Caicos. These are Bellevue, Windsor, Readymoney, and Loekland; they derived their names from the Loyalist plantations that were once found here. None of the settlements consist of over twenty houses and huts. Nearby are found the ruins of former plantations, frequently imposing in size and indicative that the Loyalists enjoyed considerable prosperity and possessed large numbers of slaves. Near the southern coast of the island is found the larger settlement of Kew with perhaps 300 inhabitants and the ruins of an ancient sugar factory. Altogether the island supports a population of about 1,200.

PROVIDENCIALES ISLAND

Numerous small keys are found in the passage between North Caicos and the island of Providenciales, and on these one or two sponging stations are located. The sponge fishers come here with their catch from the bank and sell the sponges to dealers, who prepare them for the market. The north-western cape of Providenciales presents a grave danger to sailing vessels bound through the Caicos Passage southward, as the cape is frequently mistaken for the neighboring island of West Caicos. Wrecks in consequence are not uncommon on the reef opposite this point, and the natives of Providenciales derive no small income from the misfortunes of the mariners. Providenciales has the highest elevation of all the keys in the dependency, the Blue Mountain being 280 feet high. The natives make half-hearted attempts at agriculture and raise enough to avoid actual starvation. Their principal occupation, however, is that of fishing for sponges and waiting for remunerative wrecks. The population of the island is about 600. Near West Harbour Bluff, to the east, is found the sea inlet called Chalk Sound, where efforts are being successfully carried on to grow sponges on concrete disks. At the mouth of this inlet is also found a small lobster cannery.

WEST CAICOS ISLAND

West Caicos was formerly known as Belle Isle and is separated from Providenciales by a boisterous, shallow, five-mile wide passage. The highest elevation of West Caicos is but 65 feet. At one time attempts were made to lay out this key in salt ponds, but the enterprise failed. In 1880 a com-

pany was formed with the intention of cultivating sisal on the island. For a time these efforts were productive, and one of the steamship companies trading in the West Indies made the key a port of call for its cargo steamers. It is doubtful if today the total population of West Caicos exceeds 40 inhabitants. A curiosity found on West Caicos is the "boiling springs"—salt-water lakes which have a subterranean connection with the sea and rise and fall with the tide. Delvin's Cove, on the northern coast of the island, is a rocky inlet in which the notorious pirate Delvin was accustomed to hide his vessel, tying branches and trees to his masts in order to screen his ship from observation. When his lookouts on Providenciales signaled the approach of a harmless West Indiaman, the pirate lost no time in warping his craft from its hiding place and giving pursuit.

OTHER KEYS

From West Caicos to South Rock, the Caicos Bank has a southeasterly trend and is bordered by a continuous line of rocks and breakers. French Cay and West Sand Spit are the only keys that are of any size. The former is frequently visited by fishermen during the nesting season, when thousands of eggs of aquatic birds can be collected. White Cay and the Seal Cays, together with numerous outlying rocks, form the southern extremity of the bank. From Swimmer Rock the bank runs due north, with the Ambergris Cays, Fish Cays, and Long Cay as its eastern boundary, until South Caicos is reached. All these keys are uninhabited.

THE PEOPLES OF AUSTRIA

By B. C. WALLIS

[With five separate maps, Pls. I-V, facing p. 64.]

Physical Configuration of the Country

Physically Austria is a congeries of fragments. Mountain, plateau, plain; the shining glories of the Eastern Alps, the desolate barren nakedness of the Karst; unhealthy coastal lowlands, healthful hill resorts—all are represented, but without connection, without either unity or cohesion. The shape of the country is that of a cross made by crooked unequal bars (Pl. I).

EASTERN ALPS

The southwestern mountain area comprises the major portion of the Eastern Alps; Vorarlberg, Tyrol, Salzburg, and Carinthia are mountain provinces where extensive areas lie more than a mile above sea level. The peninsula of Istria and the neighboring province of Gorizia and Gradisca, together known as the Küstenland, contain a part of the alluvial lowland which is characteristic of the northern end of the Adriatic Sea. In Dalmatia a piece of the Dinaric Alps drops steeply to the shore, and the coast is fringed by numerous islands which lie parallel both to the coast and the mountain ridges; the harbors lack facilities for the development of inland traffic with the Balkan States, and Dalmatia is isolated, so that these sheltered waters are but the havens of an industrious fishing population. Here, and again in Istria, are bits of the Karst district, with rivers which tumble down swallow holes and vegetation patches which break off abruptly where the limestone yields a deficient supply of water. In Carniola and Styria there are Alpine forelands where the rivers Mur, Drave, and Save flow eastwards to the lowlands of Hungary; the western and mountainous portions of the valleys are typical longitudinal valleys of the Eastern Alpine system, and only when the rivers approach closely to the Hungarian boundary do the valleys broaden out into plains. These are flooded when the rivers are reinforced from the melting of the snow and form typical marshy alluvial lowlands.

CARPATHIAN FORELAND

In Galicia and Bukovina a portion of the Great European Plain adjoins the Carpathian forelands. In the east of this region rivers like the Dniester rise near the Carpathian crests, flow quickly to lower levels, and wind in trenchlike valleys eastwards, thus forming a part of the drainage system of the Black Sea. In the west many streams flow northwards from the Carpathians to the Vistula, while the San and the Bug have their origin

in the plains, so that the area belongs to the drainage system of the Baltic Sea. Neither mountains nor rivers give this long narrow portion of the Austrian cross a distinct individuality.

BOHEMIAN PLATEAU

The nearest approach to a geographical unity occurs in the plateau of Bohemia, which consists almost entirely of the basin of the upper Elbe and so drains northwards to the North Sea, downhill from Vienna. The only entrance to Bohemia at a lower level than 1,000 feet above the sea is the gateway through which the Elbe escapes from the plateau, almost the most northerly point of Austria. The small province of Silesia is split into two portions by an extension of Moravia. The eastern bit is similar to western Galicia; the western piece is mainly a projection of the mountain rim of the plateau of Bohemia; between them the Oder escapes from Austria towards the Baltic Sea. Southwards from this narrow passage between the heights of Bohemia and the northwestern Carpathians, the Moravian Gate, the province of Moravia occupies the basin of the upper March, which contributes its flood to the Danube. The lower March forms a bit of the Hungarian boundary, so that only the western portion of its valley is Austrian, in the province of Lower Austria. Finally, Lower and Upper Austria are a transitional land, in which lies the Austrian fragment of the Danube. This area connects the wide German upper Danube valley with the wider and lower Hungarian Danube lowlands. At the eastern end the basin of Vienna resembles the Little Alföld of western Hungary.

AUSTRIA A PART OF THE EUROPEAN ISTHMUS

Europe is physically a peninsula of Asia, and Austria forms a part of the isthmus between the Baltic and Adriatic Seas. The land slopes downwards in opposite directions in the north and south, and the intervening mountain area turns the face of the country eastwards, with an eye—the basin of Vienna—looking towards Slavdom and the continental East and away from Western Europe and the lands beyond the ocean.

The southern Tyrol—the basin of the upper Adige—Bohemia, similarly a river basin, and Bukovina illustrate the detached nature of the Austrian fragments and by their drainage to different seas accentuate the divergence in outlook of the Austrian Empire.

Austrian Official Statistics

The maps which are here presented bring the facts concerning the peoples of Austria into line with those regarding the peoples of Hungary, which formed the subject of a previous article,¹ but it is necessary to indicate an essential difference between the official publications of the separate parts of the Dual Monarchy. In the case of Hungary the details concerning the

¹ B. C. Wallis: *The Peoples of Hungary: Their Work on the Land*, *Geogr. Rev.*, Vol. 4, 1917, pp. 465-481.

population are so voluminous that it only requires time and patience to elicit the facts in almost any line of inquiry, whereas the Austrian publications become the more baffling as one's investigations proceed. This fact is of considerable importance in view of the frequency with which the accuracy of official population statistics is called into question; for the Hungarian publications provide adequate material for the publicist who wishes to demonstrate the falsity of the official figures, while the Austrian publications are not nearly so open to investigation. The statistics concerning the Austrian villages are hidden away in a *Gemeindelexikon* parts of which only have been available to the writer; but the absence of details for small areas is not so serious in the case of Austria as it would be in the case of Hungary, for in the western country the nationality boundaries tend to coincide with the boundaries of the administrative division, whereas in Hungary they usually cut across the boundaries of the counties. For instance, it is obvious from a glance at Table I (p. 57) that there is not much room for any but German villages in Salzburg, and in areas of two nationalities like Bohemia the *Gerichtsbezirke* are usually predominantly of one nationality. In official summaries and discussions of the Austrian census returns the basis of examination is not national but geographical; for example, Gorizia and Istria are frequently grouped together as the *Küstenland*. The North Slav group of the Czechs, Moravians, and Slovaks, who combine to form the bulk of the population of Bohemia and Moravia, is always lumped together, so that it is not possible, for instance, to discover how many Slovaks there are either in Moravia or in Vienna if one wishes to test the assertion that many Slovaks move across the frontier from Hungary into Austria.

AUSTRIAN VS. HUNGARIAN STATISTICS

It is possible to give an apposite illustration of the difference between the Hungarian and the Austrian published returns. It has been alleged on the one hand that the Hungarian census fails to register the total number of Rumanians in Transylvania and on the other hand that the Austrian census does not record the total number of Ruthenians in eastern Galicia. In the first case the argument is based upon the assertion that there are no Magyar Uniates, and in the second case that there are Ruthenian Roman Catholics. In Transylvania the records show a larger total of Uniates than the combined totals of the non-Magyar races who are known to be Uniates; hence it is argued, on the assumption that there are no Magyar Uniates, that the excess of Uniates must be really Rumanians who are not officially recorded as Rumanians. In the case of Galicia the total number of Ruthenians recorded agrees with the total number of Greek Catholics, while the total number of Poles recorded agrees with the number of Polish Jews combined with the number of Roman Catholics; hence, it is concluded, on the basis of the statement that there are some Ruthenian Roman Catholics, that the number of Poles on record exceeds the actual number of Polish inhabitants

in eastern Galicia, and that the recorded number of Ruthenians is smaller than it should be. Each of these arguments depends upon a precise statement. In the case of Transylvania the statement may be immediately disproved: the records show that there are Magyar Uniates; in the Austrian case, similar records fail to indicate any satisfactory fact, because the religious groupings of the Ruthenians does not distinguish between Roman and Greek Catholics, and thus does not show whether there are, or are not, any Ruthenian Roman Catholics; and the investigator is baffled. All that he can find out is that the Ruthenians of Bukovina are Greek Orthodox and that the Ruthenians of Hungary are Greek Catholics.

The Distribution of the People

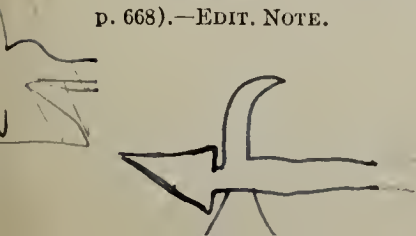
In the main the distribution of the people of Austria is inverse to the elevation of the land. The high mountains and the lower highlands are scantily peopled (Pl. II). The lowland strip near the Adriatic is more densely peopled; the eastern edges of Styria and Carinthia carry a population intermediate in density. In Galicia the area of densest population is, however, not the lowest land; the chief grouping of the people is along the middle of the country, with fewer people along the northern riverine lowlands and along the Carpathian slopes to the south. From the Moravian Gate westwards to the northwest corner of Bohemia the population on the slopes is in striking contrast to the population on the slopes of Galicia and of Dalmatia; in Bohemia there are stretches of hill country with a population which exceeds 640 per square mile (Pl. II). The southwest hills of Bohemia carry as many people as the Carpathian slopes. Moravia is well peopled, especially in the central portion. Probably nothing illustrates the comparative unimportance of the passageway of the Danube so well as the paucity of the population, even in the neighborhood of Linz and Vienna, in comparison with the denser population along the Elbe and around Prague in Bohemia. The most notable fact concerning the distribution of the inhabitants is the long narrow belt of dense population which stretches roughly along the parallel of 50° N. from 12° E. to 26° E., i. e. for more than 500 miles. This band of people is separated from Hungary and the south of Austria by the mountains and is continuous beyond the limits of Austria both westwards into Germany and eastwards into Russia.²

The Distribution of the Nationalities

RACIAL HETEROGENEITY

Plate III shows the patchwork of races of which Austria consists. There is no Austrian race, and every race represented within the empire extends beyond Austrian limits. From the Danube lands of South Germany the

² This relation is well brought out on L. Weise's population density map of Europe, 1:10,000,000 (*Petermanns Mitt.*, Vol. 59, I, 1913, Pl. 2; generalized in 1:42,000,000, *Bull. Amer. Geogr. Soc.*, Vol. 45, 1913, p. 668).—EDIT. NOTE.



Germans extend across Austria into Hungary between the Danube and the Mur and reappear in islands farther east near the Danube and in Transylvania. In southern Austria the Italians reach into Tyrol, Gorizia, and Istria, while Serbo-Croats from the east overflow down the slopes of Dalmatia to the Adriatic, and even into the east of Istria. In the northeast the Rumanians extend some distance up the rivers into Bukovina; the Ruthenians flow up the Carpathian foreland and lap over the crest line of these mountains into Hungary. The Poles stretch from beyond the Vistula southwards to the crest line of the Carpathians and provide the only instance where a linguistic boundary coincides for many miles with the political frontier. From the Moravian Gate westwards the Germans reach down the inner slopes of the northern hills to the lowland. All these races are represented in Austria by minorities of the totals of the respective race groups. Even the Slovenes in the south are a fragment of the South Slavs, who are represented in Hungary, Bosnia, and Serbia by the Serbs and Croats. The Czech group of North Slavs—Czechs, Moravians, and Slovaks—is, however, confined to Austria-Hungary, with the majority in Austria.

Racially, then, Austria differs from Hungary because there is no race similar to the Magyars centrally situated and different in character from the other races of Western and Central Europe, and because the Austrian races are more compactly knit; for the only islands of any importance are the German islands in the south of Carniola among the Slovenes and in the north among the Czechs.

RACIAL DISTRIBUTION AND POPULATION DENSITY

The Germans live in areas of scattered population except along the populous borders of Bohemia and eastern Silesia. The belt of dense population along 50° N. includes Germans on the western border, Czechs, Moravians, etc., to the Moravian Gate, Poles in Galicia, and Ruthenians, with Polish islands, in the east. The Slovenes occupy the area of moderate population on the Alpine forelands in Carniola and reach as far west as the environs of Trieste, which, like Fiume, is a port mainly inhabited by Italians and surrounded by Slavs. The Italians inhabit the scantily peopled southern Tyrol, where they tend to push up the valleys, and the more densely peopled coastal plains of Gorizia and Istria. The Serbo-Croats (for the Austrian census returns do not distinguish between Serbs and Croats) inhabit sparsely populated Dalmatia, the east of Istria, and the coastal islands.

THE JEWS

Plate III does not provide any indication of the distribution of the Jews, since the Jews are officially recorded among the religions and not among the races. They form 9 per cent of the population of Vienna, 1 per cent in Bohemia, 2 per cent in Moravia and Silesia, 11 per cent in Galicia, and

13 per cent in Bukovina. One-third of the Jews are classified as Germans by nationality, just over a half are Poles. In Galieia and Bukovina three-fifths of the official Germans are Jews, and in Galicia one-sixth of the official Poles are Jews.

DEMOGRAPHICAL CONDITIONS

The total Austrian population of 28,500,000 is distributed among the provinces as indicated in Table I, where it is shown that of 17 provinces four are definitely German, one Slovene, and one Serbo-Croat.

TABLE I—POPULATION, NATIONALITY, AND RELIGIONS

PROVINCE	POPULATION IN THOUSANDS	PERCENTAGES	
		RELIGION	NATIONALITY
Lower Austria.....	3,532	96% Roman Catholic	96% German
Upper Austria.....	853	97 " "	100 "
Salzburg.....	215	98 " "	100 "
Styria.....	1,444	98 " "	71 " 29% Slovene
Carinthia.....	396	94 " "	79 " 21 " "
Carniola.....	526	100 " "	94 Slovene
Trieste.....	230	95 " "	62 Italian 30 Slovene
Gorizia.....	261	99 " "	62 Slovene 36 Italian
Istria.....	404	99 " "	44 Serbo-Croat 38 " "
Tyrol.....	947	99 " "	57 German 42 " "
Vorarlberg.....	145	98 " "	95 "
Bohemia.....	6,770	96 " "	63 Czech 37 German
Moravia.....	2,622	95 " "	72 " 28 " "
Silesia.....	757	84 " "	44 German 32 Pole
Galicia.....	8,026	47 " "	59 Pole 40 Ruthenian
Bukovina.....	800	68 Greek Orthodox	38 Ruthenian 34 Rumanian
Dalmatia.....	646	83 Roman Catholic	96 Serbo-Croat
Total.....	28,574		

NATURAL INCREASE AND MIGRATION

The values given in Table II are obtained from the examination of sample areas where the people are definitely of the nationality specified. The German birth rate is about 30 per thousand per annum and the death rate about 22, which gives an average rate of natural increase of the population of about 8 per thousand per annum. The German population does not increase uniformly at this rate, since it is disturbed both by internal migration and by emigration. The net results of these movements of the people are shown in the column headed "Migration." The Germans increase by migration in Lower Austria, Salzburg, and Styria, and these are the only instances in Austria of this kind of population increase.

The Slovene birth and death rates are approximately 36 and 24 respectively, which gives a rate of natural increase of 12, which is one and a half times that of the Germans. The Slovenes are diminishing by a migration outwards which is roughly equal to two-thirds of the natural increase.

The rate of natural increase of the Serbo-Croats (14 per thousand) is higher, and the migration is on a smaller scale than that of the Slovenes, so that the Serbo-Croats are tightening their hold upon their lands more definitely than the Slovenes.

The Italians are prolific, and, since the death rate is equal to that of the Slovenes and Serbo-Croats, the rate of natural increase is higher, being in fact almost double that of the Germans. The migration outwards is comparatively small, but indicates curious differences, for in Istria it is less than that of the Serbo-Croats, in Gorizia it is less than that of the Slovenes, but in the Tyrol it is greater than that of the Germans.

TABLE II—NATURAL INCREASE, MIGRATION, AND ILLITERACY BY RACES

PROVINCE	MEAN ANNUAL RATES PER 1,000 OF THE POPULATION				PERCENTAGE OF POPULATION OVER 6 YEARS OF AGE ILLITERATE
	BIRTH	DEATH	NATURAL INCREASE	MIGRATION	
<i>Sample German areas</i>					
Lower Austria.....	28	20	8	+5	5
Upper Austria.....	30	23	7	-2	5
Salzburg.....	31	23	8	+2	7
Carinthia.....	32	23	9	-3	21
Styria.....	28	22	6	+2	12
Tyrol.....	30	22	8	0	4
Vorarlberg.....	29	19	10	-2	2
Bohemia, Moravia, Silesia.	31	22	9	-4	4
<i>Sample Italian areas</i>					
Istria.....	41	24	17	-5	65
Gorizia.....	38	20	18	-1	32
Tyrol.....	34	23	11	-6	7
<i>Sample Slovene areas</i>					
Carniola.....	35	25	10	-7	22
Styria.....	33	22	11	-8	20
Gorizia.....	45	25	20	-14	24
<i>Sample Serbo-Croat areas</i>					
Istria.....	38	22	16	-9	77
Dalmatia.....	38	24	14	-5	73
<i>Sample Czech areas</i>					
Bohemia.....	31	21	10	-5	4
Moravia, Silesia.....	37	22	15	-7	4
<i>Sample Polish areas</i>					
Silesia.....	38	26	12	-1	8
Galicia.....	40	23	17	-10	42
<i>Sample Ruthenian areas</i>					
Galicia.....	45	30	15	-4	80
Bukovina.....	42	29	13	-9	73

Among the Czechs the rate of natural increase is about 12 per thousand, owing to lower birth and death rates than prevail among the Slovenes. Since the migration outwards is small the Czechs are maintaining their hold on their territory strongly in comparison with the Germans.

Going eastwards, Poles and Ruthenians are found to be increasingly prolific with a correspondingly higher death rate, so that the rates of natural increase of Poles and Ruthenes are 16 and 14 respectively. Poles and Italians increase naturally at approximately the same speed. In Galicia the Poles migrate more rapidly than the Ruthenians, and their loss by migration is the highest in Austria with the single exception of the Slovenes from Gorizia. The Ruthenians migrate in large numbers from Bukovina, although some of them get no farther away than Galicia.

By comparison with the other races the Germans have the lowest birth rate and the lowest rate of natural increase as well as the smallest losses by migration.

ILLITERACY

The figures in Table II with reference to illiteracy show notable differences. The percentage of illiterates among Germans, Czechs, and Tyrolese Italians is low, and there is a steady increase among the Slovenes, Poles, Serbo-Croats, and Ruthenians in order of magnitude. This table does not indicate that illiteracy is a necessary consequence of a scattered population, since the proportions in Vorarlberg and Tyrol are low and are lower in Upper Austria than Carinthia. Nor is it due to the quality of the race concerned, since there occur considerable differences both among the Germans and the Italians, while the Slovenes are much less illiterate than the other South Slavs, the Serbo-Croats. Only in the case of the Ruthenians can it, perhaps, be attributed to differences in education due to differences in religion, since the other peoples are Roman Catholic. The probable explanation divides the responsibility between economic and political causes, for the greatest industrial areas are the least illiterate, and facilities for education are distributed unevenly. A compulsory education system administered with consistent firmness could not tolerate such differences, and to western minds the fact that four adults out of five are unable to read and write seems little short of astounding.

VITAL STATISTICS

An excess of men over women occurs in the provinces where the people are chiefly Italians or Serbo-Croats; the greatest excess of women over men is to be found among the Slovenes in Carniola.

TABLE III—VITAL STATISTICS

PROVINCE	NUMBER OF WOMEN PER 1,000 MEN	MEAN PER- CENTAGE OF TOTAL BIRTHS ILLEGITIMATE	MEAN PER- CENTAGE OF LIVING BIRTHS WHO DIE IN FIRST YEAR	MEAN PERCENTAGE OF TOTAL DEATH DUE TO	
				TUBERCULOSIS	INFLAMMATION OF THE LUNGS
Lower Austria.....	1,046	23	19	16	9
Upper Austria.....	1,017	19	22	11	6
Salzburg.....	995	25	20	11	8
Styria.....	1,006	24	19	12	7
Carinthia.....	998	38	19	11	8
Carniola.....	1,099	6	18	15	7
Trieste.....	1,040	18	19	19	14
Gorizia.....	961	4	19	14	7
Istria.....	912	5	19	13	8
Tyrol.....	991	7	20	12	9
Vorarlberg.....	1,012	7	16	18	7
Bohemia.....	1,017	12	20	15	7
Moravia.....	1,066	10	20	17	10
Silesia.....	1,046	10	21	17	9
Galicja.....	1,038	9	21	12	13
Bukovina.....	1,021	10	23	8	9
Dalmatia.....	1,000	4	17	12	5
Total.....	1,036	12	20	14	9

The figures for illegitimacy indicate striking differences among the several races. Wherever the proportion of Germans is high there the illegitimacy rate is double the average for Austria; the lowest rates occur among the Italian and Slav provinces in the south, the Polish and Ruthenian districts in the northeast being average. A high rate of infantile mortality

occurs among the prolific Ruthenians, but this rate is almost equaled among the Germans in Upper Austria; the lowest rates are found among the scanty German population of Vorarlberg and the sparse Slav population of Dalmatia. Roughly a quarter of the deaths in Austria are due to tuberculosis or inflammation of the lungs. The incidence of these diseases is greatest among the Italians of Trieste and the Czechs. The variations in the rates are related to the elevation of the provinces above sea level.

EMIGRATION

The figures given in Table II under the head of "Migration" are compounded of two movements, emigration out of Austria and migration inwards or outwards with reference to each province. The net result of the exchange of people between Austria and Hungary is a gain for Austria, since many people from Hungary go to live in Vienna and there are movements of Germans and Slovaks out of Hungary. For many years four-fifths of the oversea emigration from Austria has been to the United States and a twelfth each to Canada and to South America (Argentina and Brazil). The total number of emigrants during the 35 years between 1876 and 1910 was 1,846,000; but there appears to be no record of the number of emigrants who returned to Austria. Approximately two-thirds of the emigrants were males, and nearly three-quarters of them were within the age limits of 15 and 40 years; nearly half of them left work on the land to emigrate. In the first ten years of this period, 1876-85, half the emigrants left Bohemia and an eighth left Moravia, so that the Czech peoples afforded the chief contribution to the emigrant stream, which was then of small dimensions. The Poles only provided 10 per cent of the total. During the period 1910-14 the total net emigration from Austria to the United States averaged 79,000 per annum; of these 36 per cent were Poles, 24 per cent Ruthenians, 10 per cent Czechs, and 7 per cent Germans.

The change in the racial character of the emigration is to some degree indicative of changed economic conditions, but it is noteworthy that throughout the period the German contribution to oversea lands has been always below the average. In addition to the constant stream of Austrians to America there are regular movements of seasonal laborers—people who spend less than a year outside Austria and then return—from Galicia into North Germany and from the German provinces into South Germany. Similar movements in the opposite direction occur in Tyrol and Carniola, where Italian or Croat laborers invade these provinces respectively for a portion of the year. During the period 1907-09 the seasonal movements numbered at least 60 per cent in excess of the oversea emigration.

MOVEMENT TO THE CITIES

A portion of the internal migration of the people takes the form of a movement towards Vienna and the large towns. Such an urban influx,

however, does not attain the magnitude which is typical of the "rush to the towns" in Hungary. Of 38 chief towns in Austria, only six increased their population by more than 120 per cent during the period 1880-1910. These were the German towns Ostrau, Gablonz, and Brüx, the Polish towns Przemyśl and Stryj, and the Italian port of Pola. Twelve towns had an increase between 80 and 120 per cent; the German towns Vienna, Czernowitz, Innsbruck, and Aussig, the Polish towns Lemberg, Cracow, Kolomea, and Drohobycz, the Czech towns Pilsen, Smichow, Budweis, and the Italian port Trieste. Five towns failed to increase by even 40 per cent; the German towns Reichenberg, Wiener Neustadt, and Iglau, the Czech capital Prague, and the Polish town Tarnopol. The remaining fifteen towns increased between 40 and 80 per cent; of them nine are German, Graz, Brünn, Linz, Troppau, Klagenfurt, Marburg, Teplitz, Eger, and Salzburg; two are Polish, Tarnów and Stanisławów; two Italian, Trent and Gorizia; while Laibach is Slovene and Prossnitz is Czech.

CRIMINALITY

Table IV refers to one section of the criminal population of Austria, those who commit outrages upon other human beings, including the murderers. The Slovenes of Carniola show a very high proportion, especially with regard to the more serious attacks on others. Next on the list come the Slavs of Dalmatia, closely followed by the Poles and Ruthenians of Galicia and Bukovina. The more highly educated peoples—the Germans and Czechs—are least addicted to this form of criminality.

TABLE IV—CRIMES OF VIOLENCE AGAINST THE PERSON
(Per million of the population)

PROVINCE	SERIOUS	LIGHT
Lower Austria.....	100	1,697
Upper Austria.....	198	2,049
Salzburg.....	214	2,087
Styria.....	470	2,761
Carinthia.....	238	2,849
Carniola.....	842	4,231
Gorizia.....	278	2,459
Tyrol, Vorarlberg.....	158	1,714
Bohemia.....	80	1,081
Moravia.....	156	1,746
Silesia.....	217	2,829
Galicia.....	263	5,731
Bukovina.....	338	4,040
Dalmatia.....	535	3,078
Total.....	212	2,975

CONCLUSIONS

The net result of all these considerations does not suggest that the Germanic is the most capable race in Austria. Despite the high standard of education the proportion of illegitimate births is excessive; despite the lowness of the birth rate the infantile mortality rate is equal to the average for Austria. Despite the fact that education is compulsory and that the administration is largely controlled by Germans, the government tolerates

a situation where more than half of most of the "subject races" are illiterate. It may be said in behalf of the government that religious toleration exists, but such a claim counts for little in view of the fact that most Austrians are Roman Catholics, while it must be noted that Austria is notorious for the clerical influence which bears very heavily upon the conduct of the government of the country. The Czechs are as highly educated as the Germans and inhabit areas of greater economic possibilities than they, yet the disproportion between Czech and German elements among the emigrants is indicative of unequal racial treatment.

Agriculture

CROPS

More than half of the people of Austria derive their living from the land. Plate IV indicates certain geographical limitations to the distribution of the crops. The mountain area of the far west and the province of Istria produce fair quantities of only maize and wine; Gorizia, the neighbor of Istria, yields only wheat and maize. These southern areas show the influence of Mediterranean climatic conditions and agriculture in Austria. Barley is produced by the Czechs, Poles, and Ruthenians in the colder north, which is most affected by continental conditions of climate. Maize and wine are Mediterranean crops in the Slovene Alpine forelands. Potatoes are produced by the barley growers and by the Germans on their eastern borders. The Czechs alone grow extensive crops of sugar beets, and thus outdo the Austrian Germans in what has come to be considered a typical Germanic industry. It may be noted in this connection that the neighboring Slovaks in Hungary excel in the same forms of tillage as the Czechs. Moravia is the most successful farming province, then follow Bohemia, Galicia, and Bukovina, all of which are non-German. This fact follows from the consideration of Plate IV, and its importance is largely increased when it is remembered that the belt of dense population traverses this very area.

The full significance of Plate IV can only be appreciated when it is examined in close relation to Plate III. Both relatively per head of the population and proportionately in reference to the total yield of the Austrian crops the Germans are seen to be comparatively inadequate farmers; the Czechs are by far their superiors, and the more illiterate Poles and Ruthenians show themselves to be more capable cultivators.

• The root crop areas are continuous with those of northwest Hungary; the total wheat crop of Austria is but a quarter of the Hungarian crop, while the Austrian crops of barley, oats, and rye exceed those of the neighboring state.

FARM ANIMALS

Plate V shows the distribution of farm animals. Horses, cattle, and swine are reared everywhere, but sheep are confined to three elevated

regions, the Germanic mountains, the Slav Karst mountains, and the Ruthenian Carpathian hills. Upper Austria, Salzburg, and Carinthia are the chief areas for farm animals, these being almost entirely Germanic lands. The lower lands, the great producers of cereals and roots, are the least valuable for pastoral farmers, so that the Czechs are the least successful rearers of stock.

In comparison with Hungary, Austria supports on an equivalent area almost as many horses, 50 per cent more cattle, two and a half times as many sheep, and about as many swine; although neither country is a great rearer of animals, judged by English standards.

In comparison with the other peoples the German excels as a rearer of animals, and this compensates to some degree for his inferiority as a cultivator of the soil. He shows this ability in an area which extends from Upper Austria through Styria into the Germanic areas within the boundaries of Hungary. In similar fashion the Slovene in Carniola resembles the Croat in the neighboring Hungarian areas as a rearer of animals. In Plate V Styria and Carinthia appear to be less effective as producers of farm animals than Upper Austria and Salzburg, but when the greater population density indicated in Plate II is taken into consideration the disparity tends to disappear. Finally, it must be remembered that Austria contains a very high proportion of forest land, especially among the mountain areas, so that many Germans are foresters.

SUMMARY

Austria, then, consists on the one hand of mountainous areas where the Alpine and other pastures give rise to a population of herdsmen and foresters, and on the other of upland and lowland areas whose soil yields abundant crops only in the north, where continental climatic conditions prevail. The southern peoples are largely limited by the Mediterranean conditions of climate and economic development under which they live. Physically a congeries of fragments, nationally a patchwork of races, Austria is also a combination of three types of agricultural productivity. There is neither a physical nor an agricultural link which unites the Germans with the "subject races" of the north, or with the Slavs and Italians of the south. Probably the strongest contrast within the Dual Monarchy lies between the German herdsmen and foresters and the Magyar farmers on the Alföld.

Claims of the "Subject Races" against Austria

Although the Italians in the Tyrol inhabit merely the lower end of the Austrian part of the Adige valley, their claim is extended "for strategic reasons" up to the watershed, so as to include the whole area that drains to the Plain of Lombardy. Similarly, the Italians occupy but the western strip of Istria, yet they claim parts of the South Slav lands, for economic

reasons connected with the ports of Trieste and Fiume, where the majority of the people form Italian islands. The South Slav movement aims at the incorporation in Greater Serbia of the Austrian lands inhabited by Slovenes and Serbo-Croats. This implies that the linguistic boundary indicated in Plate III by the 50 per cent line which stretches northwards across Istria and includes the province of Carniola should be approximately the international boundary. In the north there are four claims to Austrian lands, those of the Czechs, Poles, Ruthenians, and Rumanians. The Czech aims at the incorporation of Bohemia, Moravia, and Hungarian Slovakia as a Bohemian state. The new Poland would include the western portion of Galicia, while the successful accomplishment of "Little Russian" aims would join together part of Russia with eastern Galicia, northern Bukovina, and the inner slopes of the Carpathians in Hungary. Finally, Greater Rumania would include the southern portion of Bukovina.

Apart from the question of the Germanic attitude towards these claims there are elements of discord both in north and south, which are due to the fact that the peoples are not separated by distinct natural features. The linguistic boundary between Italian and Slav in the south cuts across the peninsula of Istria and leaves the two great ports—Trieste and Fiume—as Italian islands fringing a Slav sea. In the north the linguistic boundary between Pole and Ruthenian is somewhat hard to define, since there are many Poles in eastern Galicia, and the difficulty is increased by the fact that the lowland and the belt of dense population would cross the linguistic boundary at a place which would not be marked by any physical feature of importance such as marks the Austro-German boundary, which is of the same type nationally and is defined at present by the Elbe Gate.

THE FINAL SETTLEMENT

There can be little doubt that if the "nationalities" receive fair treatment in the final settlement new political boundaries will be erected somewhere in the neighborhood of the 50 per cent lines shown in Plate III. It would follow from this that the Germans in Austria would be limited to the mountains and the Danube passage. They would be barred politically in their outlook eastwards and in their outlook towards the Mediterranean; they would be separated politically from Prussia by the Czechs and would be compelled to re-orient their outlook and to approximate in character to one of the existing states of South Germany. Should strategic or other considerations necessitate the foundation of a Slav march, as mentioned in the earlier article,³ the Germans would be separated from the Magyars; otherwise the boundary between German and Magyar would stretch from the Danube near Pozsony to the Mur. In any event, since the Danube is not very important as a waterway above Vienna, the Germanic hold upon the great river of Central Europe would be seriously curtailed. Economi-

³ Cited in footnote 1, reference on pp. 479-480.

AUSTRIA

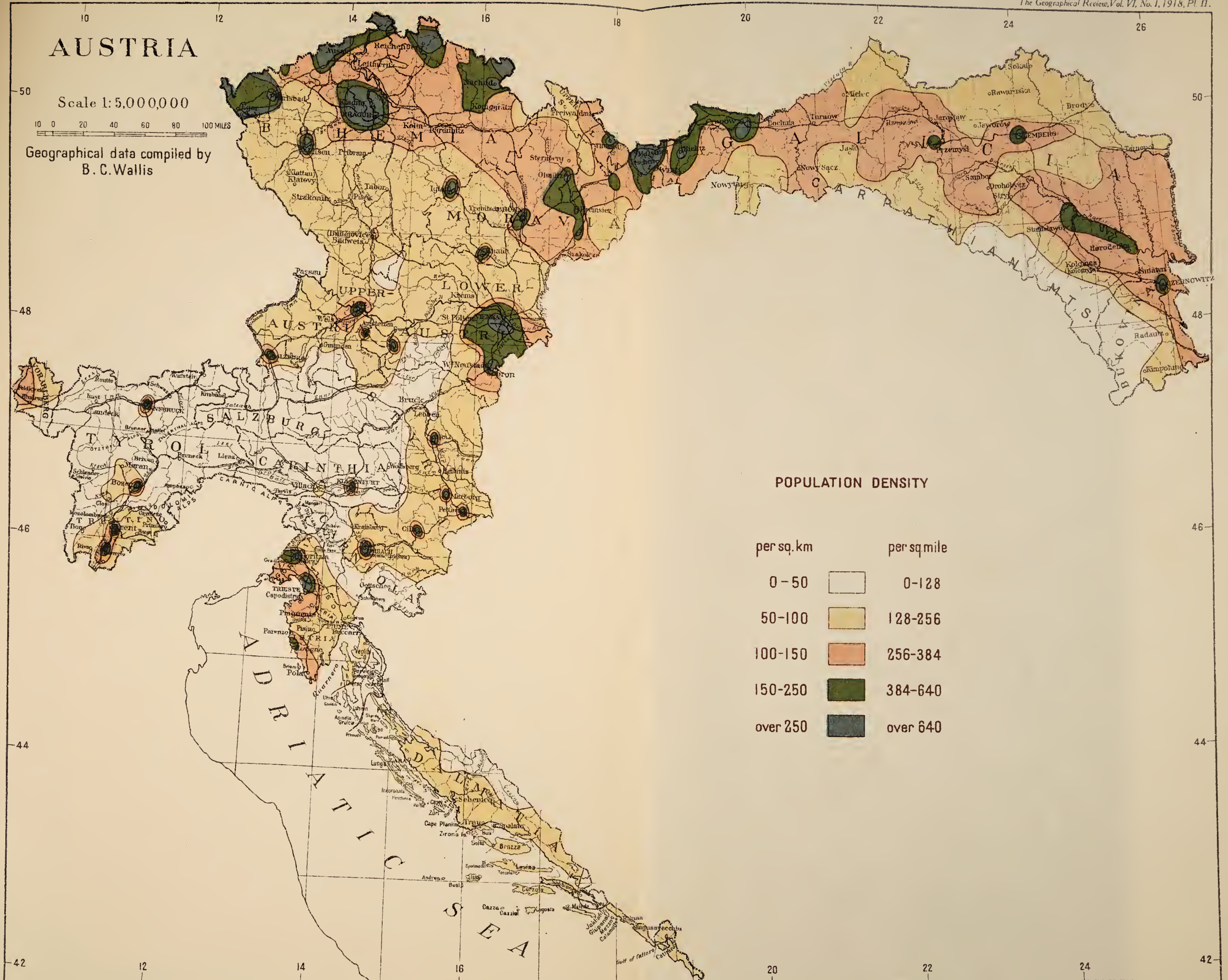
Scale 1:5,000,000

10 0 20 40 60 80 100 MILES

Geographical data compiled by
B. C. Wallis

RELIEF

below 1000 feet		below 300 meters
1000-3300 "		300-1000 "
over 3300 "		over 1000 "











cally, the Austrian Germans would be stripped of many elements of national prosperity. The main farm lands are not German; the main mineral resources of Austria are outside the German territories; the chief industrial area of Austria lies within the lands of the Czech. Their future prospects would lie towards development upon Swiss lines, with the typical Swiss limitations of high mountains and no coast line.

Could Vienna decline to the level of Bern? Situated at one of the most definite nodal points in the world, the crossing place of the great east-and-west route through the heart of the European peninsula with the great north-and-south isthmian route from the cold Baltic to the sunny Mediterranean, could the loss of political influence be replaced by other influences which would restrain the inevitable decay? Or must Vienna, a second great city of Roman Catholicism, follow the fortunes of Rome?

DUTCH CARTOGRAPHERS OF THE SEVENTEENTH CENTURY

By W. REDMOND CROSS

Through the long turmoil of the sixteenth century in Europe, while liberty battled grimly against the Spanish plan for world dominion, one thought recurred persistently to the minds of all classes. To be sure, the form of the thought varied with the thinker, for each class thought of the thing which it desired. The king saw a new empire, the peasant dreamed of a home free from wars and feudal taxes, the merchant planned a lucrative trade in valuable commodities, the priest had visions of millions of unbelievers brought into the fold, and the adventurer had before him a field brimming with excitement and containing possibilities of boundless reward. Hopes differed, but all had the same source. In palace and cottage, in banking house and cloister, one subject of discussion never failed—the New World.

This widespread interest naturally led to a demand for maps to aid in the visualization of the newly found lands, and the result was a development in the science of cartography that was remarkable. The artistic possibilities were also appreciated, and a great deal of progress was made in the decoration both of the map proper and of the surrounding border. For the first the usual method was to introduce ships and marine monsters at sea and to people the land with beasts and savages. More elaborate work was done on the borders, particularly in the *mappemondes*, and they frequently contain compositions of great beauty. The cartouches upon which appeared the name of the map and its maker were usually highly decorated. The improvement for the century reached its high point in the genius of Mercator and the industry of Ortelius, who were the first cartographers to give a tolerably correct picture of the outlines of America and who should be recognized as the foundation stones of the school which is the subject of this article.¹

DUTCH SUPREMACY ON THE OCEAN

The successful defence of the United Provinces against the mighty power of Spain was followed by a period of extraordinary prosperity. Dutch

¹ On this general topic see:

Justin Winsor: *The General Atlases and Charts of the Sixteenth and Seventeenth Centuries*, in "Narrative and Critical History of America," edited by Justin Winsor (8 vols., Boston and New York, 1884-89), Vol. 4, pp. 369-377.

P. L. Phillips: *A List of Geographical Atlases in the Library of Congress*, with bibliographical notes, 3 vols., Library of Congress, Washington, D. C., 1909 and 1914.

Woodbury Lowery: *A Descriptive List of Maps of the Spanish Possessions Within the Present Limits of the United States, 1502-1820*, edited, with notes, by P. L. Phillips, Library of Congress, Washington, D. C., 1912.

captains penetrated into the remotest corners of the seven seas, and Dutch merchants captured the carrying trade of the world. For almost a century they reigned supreme in oceanic traffic, and it took three naval wars to prove that the English were their masters in this field. As late as 1667 Admiral de Ruyter sailed up the Thames and burned the English fleet at Chatham, and it was not until after the governments of the two countries were joined by William III in 1688 that the English definitely took first place in high-seas commerce.

The arrival at Amsterdam, Rotterdam, or Dordrecht of a merchantman from the other side of the world was a matter of almost daily occurrence, and it is pleasant to picture the welcome given to the home-coming captain with the solid burghers sitting about him and listening to his tales of discoveries and wondrous adventures in unknown lands.

THE BUSINESS OF CARTOGRAPHY

The demand for maps created by such conditions made the business of cartography a profitable one, and the commercial ability of the Dutch showed itself in the keenest kind of competition between the different publishing houses. They vied with each other in the issuance of sumptuous volumes, which, from the standpoint of beauty, far excel the atlases to which we are accustomed today. To understand the conditions under which almost all of the maps of this time were produced it must be borne in mind that they were issued by publishing houses, for the most part large establishments, each of which had its staff of draftsmen and engravers, so that it is impossible to tell how much work, if any, was done on a given map by the man to whom it is attributed. Jodocus Hondius and W. J. Blaeu, for instance, probably did most of the work on the maps issued by them; but their successors became, more and more, merely publishers who decided when to issue a new atlas, whether the circumstances justified the cost of preparing a new plate, and similar questions of business policy. The growth of the business aspect at the expense of the professional point of view is also indicated by the contents of the atlases, which in the second half of the century sometimes include a preponderance of plates procured from other sources than the workshop of the issuing house.

THE HOUSE OF HONDIUS²

The first great name of the period was Jodocus Hondius (1563-1611), who not only succeeded to the business of his brother-in-law Rumoldus Mercator and thereby came into possession of the plates of the famous Gerardus Mercator, but was himself an excellent workman. His maps are a delight to the eye and in some respects exhibit an accuracy which is lacking in the product of his later rivals. He founded the series of Hondius-

² See L. A. J. Quetelet: *Histoire des sciences mathématiques et physiques chez les Belges*, Brussels, 1854, p. 116 ff.

Mercator atlases, beginning with the second edition of the great Mercator, and gradually added his own plates, dropping his father-in-law's as they became antiquated. This monumental work was carried on by his son Henricus Hondius and son-in-law Joannes Janssonius and was issued in more than two dozen editions in many languages.

The younger Hondius (died 1638) was diligent in his chosen profession and was responsible for many good plates, but he cannot be classed with his father as a cartographer and had less influence on the movement than his brother-in-law Janssonius (died 1666), who produced many magnificent volumes under his own name, in addition to the work which he did on the Hondius-Mercator series.

REPEATED USE OF THE SAME PLATES

Excellent as was the work of the engravers in the decorations with which they embellished their maps, it is interesting to note that the thrifty Dutchman did not often indulge in the expense of copper and engraving merely in order to illustrate the latest reported discoveries. A plate once made was used again and again, and prints were taken from it long after it was recognized as cartographically inaccurate. Minor changes were often made on plates, resulting in different "states" which form a study in themselves. This conservatism of the makers of maps caused the perpetuation of many mistakes, of which the Island of California is a famous example. Founded on a supposed voyage from the Straits of Anian to the Gulf of California, the error appears on most of the maps of the last three-quarters of the seventeenth century and also in the eighteenth century long after its falsity had been demonstrated through the passage by land from New Mexico to California by the Jesuit Kino in 1698-1701.

ENGRAVERS' NAMES

The names of many engravers have come down to us because they were apt to try to attain immortality by cutting their names in some corner of the plate. The nomenclature of the maps is full of pitfalls, as the purchaser of a plate often replaced the name of the maker by his own and then issued the map without other change. Latinization of names was usual, as it was with authors of the period, and the simplest method seems to be to refer to the publishers by the names which they were accustomed to sign on the maps. This rule is not, however, always easy to follow, as for example in the case of the Visscher family. Nicolaas Visscher (1618-1679), apparently fearing that the public would not buy his product without the authority of a well-known name, usually added a middle initial and signed his maps Nicolaas (or N.) J. (or I.) Visscher (or Piscator). This was the name of his father (died 1637), who increased the confusion by often signing himself C. (for Claes) J. Visscher (or Piscator). In the third generation Nicolaas Visscher (1649-1709) was not so modest and signed his

own name; but, as practically none of the maps are dated, it is sometimes difficult to know which member of the family to credit with a given plate. Some of the best work of the century was turned out by this house, which, founded in 1615, was handed down from father to son until 1717, when the plates became the property of Pieter Schenk.

COLORING

The coloring of the maps was done by hand in water colors and the color scheme and technique, particularly in the case of prints from the more elaborately decorated plates, was difficult enough to justify the classing of this department as an art in itself. The larger establishments had their own colorists; but there were many outsiders who earned their living by coloring maps, and the profession was a well-recognized one throughout Europe. The quality of workmanship in the coloring of maps varies greatly and constitutes a not unimportant criterion in the eyes of the modern collector.

THE HOUSE OF BLAEU³

Encouraged by the prosperity resulting from the Twelve Years' Truce with Spain, W. J. Blaeu (1571-1638) founded in 1612 the famous publishing house which, controlled after his death by his sons and grandsons, had a larger output than any other establishment in the seventeenth century. The first atlas was not published until 1631, but the elder Blaeu was tireless in his efforts and produced a large number of splendid plates which were used by his son Joannes (1596-1673) in the atlases published by him. The product of the house of Blaeu was unexcelled for beauty and workmanship, and while, as was customary, the plates were used long after they had become antiquated, they fairly represented the extent of geographical knowledge attained at the time of their engraving.

FREDERICK DE WIT

In 1672 the Grand Pensionary John de Witt was torn limb from limb by an infuriated mob at The Hague, and by a strange coincidence this year marks the rise to prominence of his namesake Frederick de Wit, the cartographer, through his purchase of the plates which escaped destruction in the fire that ended the career of the house of Blaeu. Some of the most beautiful plates of the century came from the hands of de Wit, notably a wonderful *mappemonde* which was afterwards used by Carolus Allard.

The elder de Wit had begun as an engraver of maps in 1648; and the firm, which lasted until 1712, produced 380 land maps and 30 sea charts, all of a high standard of workmanship.

³ See P. H. J. Baudet: *Leven en werken van Willem Jansz. Blaeu*, Utrecht, 1871.

E. L. Stevenson: *William Janszoon Blaeu, 1571-1638: A Sketch of His Life and Work*, with an especial reference to his large world map of 1605, *Hispanic Soc. of Amer. Publ.* 85, New York, 1914, with facsimile of world map of 1605 in 18 sheets and key plate.

SIGNIFICANCE OF THE PERIOD

The period is interesting because it represents the high-water mark of decoration as applied to maps, and the influence of the movement lasted well into the eighteenth century, although a gradual deterioration, both in drawing and coloring, is easy to trace. With increasing accuracy went a loss of beauty, until the present period in cartography was reached. It is interesting to note that the use of symbols is increasing, particularly in the most recent maps, such as those for aviators, reminding us of the pictures of beasts by which the old cartographers used to illustrate the fauna of the different countries. There is at present a constant increase in the use of color as an aid to the visualization of the wide range of geographical phenomena, and it is to be hoped that the makers of maps will learn to select their shades with an eye to the decorative value of the completed whole instead of seeking only contrast. We have here the possibility of a product combining accuracy, symbolism, and color in a way never dreamed of by the Dutch of the seventeenth century.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Extension of the Royal Geographical Society's Hospitality to Fellows of the American Geographical Society in London. In a communication recently received from its secretary, Mr. Arthur R. Hinks, the Council of the Royal Geographical Society make known that the society has officially extended the hospitality of its house and an invitation to its meetings to any Fellows of the American Geographical Society who may be temporarily resident in London on war duty. It is hoped that as many Fellows as possible will avail themselves of the facilities so generously placed at their disposal.

NORTH AMERICA

Phototopographic and Aërial Surveying in the United States. Photographic methods have been employed in various forms for many years by surveyors in foreign countries, but the use of the camera in surveys in the United States was, until the commencement by the U. S. Geological Survey of the work in Alaska, confined to a very few special applications. Due to the enormous size and relatively small relief of a large part of our western country, the plane table has reached a high state of development in the United States. In a recent work by J. W. Bagley (*The Use of the Panoramic Camera in Topographic Surveying, With Notes on the Application of Photogrammetry to Aërial Surveys, U. S. Geol. Survey Bull. 657*) possibly the first authoritative account is given of the use of photographic surveying in the United States. (For an article on its use in Canada, by M. P. Bridgland, with general references on phototopography, see the *Review* for July, 1916.) Major Bagley himself has devised some new instruments and methods and has proved conclusively that the panoramic camera is extremely valuable in certain kinds of topographic work. It is shown that the field cost of surveys made by the use of panoramic camera and plane table is far lower than that of surveys made by the plane table alone, and, though the compilation of the field data in the office is more laborious, the final cost of the completed map is nevertheless lower.

Of special interest at this time is a chapter on "The Application of Photogrammetry to Aërial Surveys," based largely on French treatises. Since the publication of this work, the War Department has afforded Major Bagley opportunity to try out his theories in practice. As a result a tri-lens camera and a special transformer have been developed, and Major Bagley is now engaged in training and putting into the field military aërial survey parties for the preparation of aëronautical maps. The appearance of a supplementary publication describing his further researches will be eagerly awaited.

JAMES GORDON STEESE

Tornadoes as Climatic Phenomena of the United States. No discussion of the climates of the United States is complete without reference to tornadoes. These have their fullest development over the great central lowlands of the country. They are peculiarly and characteristically American. Nowhere else in the world do they find equal opportunity. Nowhere else are they as frequent, as violent, as destructive, as here. It is from the larger climatic point of view that American tornadoes are considered in a recent paper by Professor R. DeC. Ward of Harvard University ("The Tornadoes of the United States as Climatic Phenomena," *Quart. Journ. Royal Meteorol. Soc.*, Vol. 43, 1917, pp. 317-320). The purely meteorological aspects of the tornado are given slight emphasis. But, as what a tornado *does* is determined by what it *is*, the nature of these phenomena is necessarily considered. The subjects taken up are damage and loss of life in tornadoes; distribution of tornadoes in place and time; tornado weather types; protection of life and protection of property, including tornado insurance. Three of Finley's charts of tornado damage are reproduced. There are four photographs of damage caused by the St. Louis tornado of May 27, 1896; and a new composite weather map, showing conditions favorable for tornadoes, is given. A bibliography is included.

The Different Meanings of the Terms "Leeward Islands" and "Windward Islands." Much confusion exists as to the meaning of the terms "Leeward Islands" and "Windward Islands." Now that the interests of the United States in the Caribbean

are becoming greater, the question assumes more direct importance for Americans. Practical need for a definition has been presented recently by the extension of the United States meteorological service in the West Indies. After consulting the Geographic Board, the Weather Bureau has adopted the following designation to be used in its reports: The term "Leeward" is to embrace the islands between the Anegada Channel and the island of Dominica, including the latter; the remainder of the chain, including Barbados, but excluding Trinidad and Tobago, is to be styled "Windward" (*Monthly Weather Rev.*, Sept., 1917, pp. 455-456).

It is to be feared that this grouping will not eliminate confusion, though it can scarcely add to that already existing in the usage of the terms. The U. S. Hydrographic Office, the British Admiralty in its "West Indies Pilot," and the Spanish Naval Department in the official "Derrotero" (Pilot), each employs a different grouping of the islands under these names. Furthermore standard geographical handbooks and reliable maps rarely agree in the application of the terms. It is small wonder, since the problem offers a combination of historical, geographical, nautical, and political elements.

The names Leeward and Windward were purely nautical in their original application. The Spaniards were the first to employ them. The use of the terms "Islas de barlovento" (Windward Islands) and "Islas de sotavento" (Leeward Islands) depended upon the position of the navigator, the gateway by which he entered the archipelago, and the season in which he made his voyage. The names do not seem to have been applied in the West Indies until the end of the sixteenth century, and probably their use was not general until many years later. Early maps, such as Mercator's of 1538, that of Orontius Finaeus, 1566, the two of Peter Martyr, 1534 and 1587, and that of Ortelius, 1571(?), do not employ the terms at all. Neither does Alonso de Santa Cruz in his "Islario General," 1560, though he gives a detailed account of the West Indies. The "rutters" in use among English navigators at the end of the sixteenth century make no mention of such grouping of the islands even when they list them individually, with great care giving distance and geographical location of the different ones. Juan López de Velasco, however, in his "Geografía y Descripción Universal de las Indias" (1574) speaks of Dominica as being one of the "Islas de barlovento."

The terms as used by the Spaniards were deeply significant in the days of sailing craft. Remembering the course taken by Spanish vessels going to America one can appreciate the application of the names. The trade wind path which Columbus had discovered in his second voyage was generally followed by other explorers and later by merchant ships. Early English, Dutch, and French navigators often reached America by much the same route. The Spanish traders, however, stuck closest to the course marked out by Columbus, due largely to the fact that, for safety from enemy corsairs and to comply with the government regulation of trade with America, their vessels were permitted to leave Spain but twice a year and must sail in fleets under naval escort. From 1561, when this system of convoyed fleets was established by law, until 1748, the year in which the plan was finally abandoned, Spanish commerce followed this path to the West Indies. Sailing from Spain in spring or summer, when the trade winds were constant but carried them far to the southward, they touched at the Canaries and from there steered for the easternmost islands of the Caribbean. The usual landfall was the little island significantly called "Deseada" (longed for). At Dominica or Guadeloupe, where there was wood, water, and good anchorage, a stop was made and the fleets were divided into two groups. One part went, still under escort, along the coast of the Spanish Main to Cartagena and Porto Bello on the Isthmus of Panama. The other, keeping within sight of the Greater Antilles, steered for Vera Cruz. When cargoes were discharged the ships all gathered in the harbor of Havana, where, as an old English writer quaintly says, "the royal fleet of Spain doth ryde until winde and season do combine to wafte them homeward." At times vessels bound for Panama sailed from Spain as a separate fleet and entered the Caribbean near the island of Tobago, from there skirting the coast to the isthmus.

To sailors who followed these routes there were two groups of islands which came to bear the name Sotavento. These were the northern members of the Caribbees (possibly including the Greater Antilles; see "Historical Geography of the British Colonies" by Sir Chas. P. Lucas, Vol. 2, The West Indies, p. 33) and the islands along the coast of Venezuela, the westward extremes of the arc described by the entire chain of small islands. Herman Moll's map of 1710 is typical of the many that reflect this usage of the terms. The name Barlovento was applied to the chain of islands lying farthest to the east and apparently included all from Guadeloupe or Dominica to Trinidad. Rochefort in his "Histoire Naturelle des Iles Antilles de l'Amérique" (Paris, 1667, p. 118) makes St. Christopher the dividing point and lists the islands northwestward from there (St. Eustatius, St. Bartholomew, Saba, Anguilla, Sombbrero, Anegada, the Virgin Islands, and St. Croix) as the "Iles de dessous le Vent."

In later usage there has been great diversity. The settlement of the islands by the English, Dutch, and French during the first half of the seventeenth century lessened the significance of the names as mere nautical terms, gave importance to the climatic effect of the more northerly winter trade winds, and also introduced a political element by the division of the islands among several powers. The English possessions in the Caribbees were formed into two administrative units as early as 1671, with the French colony of Guadeloupe as the dividing line between Leeward and Windward. But this political grouping has varied from time to time. The present designation "British Leeward Islands" is used to include Montserrat, Dominica, Antigua, St. Kitts (St. Christopher), and Nevis, to which are attached the smaller units of Barbuda and Redonda, Anguilla, and the British Virgin Islands. The "British Windward Islands" colony consists of St. Lucia, St. Vincent, the Grenadines, and Grenada. Preponderating English influence in the West Indies in the last two centuries has caused this political division largely to supersede the nautical and geographical grouping. The development of steam navigation in the nineteenth century finally robbed the original nautical terms of all their meaning. As a consequence the islands along the Venezuelan coast have been left without a group name, while the French and Dutch possessions and the former Danish West Indies are often understood to be excluded from the groups of which they form an integral part geographically.

In any attempt to harmonize the grouping of these islands the political factor should certainly be made secondary. A proper adjective may be prefixed to indicate the nationality of individual islands or small groups.

If weight be given to the history of the terms the correct application would be that in most common use among the Spanish navigators, and we should have the two groups of Leeward Islands, with Windward including those from Guadeloupe (or Dominica) to Grenada. If on the other hand we apply the terms with a purely geographical significance we should call only the Dutch-Venezuela group the Leeward Islands and make the term Windward include all from Grenada (or even Tobago) to Porto Rico (perhaps including the latter), since, with very insignificant exceptions, each unit of this Caribbee chain has a windward position during a considerable part of the year, the southern section being most directly exposed to the trades from May to November and the northern group during the remaining months.

"Northers" of the Panama Canal Region. The "northers" of the Gulf of Mexico, western Cuba, and the coasts of Mexico and Central America, have long been known. They are attracting more attention lately because of the increasing use of the Panama Canal. In a recent number of the *Monthly Weather Review* (Nov., 1917, pp. 546-549) there are some notes, historical and meteorological, on the "northers" of the Canal Zone. "Northers" are strong northwest to northeast winds, which blow at times from November to April. They last from one to as many as eight days and often cause damage to shipping, dock structures, etc. They result from the presence of a marked high pressure area to the northward, with steep gradients, and are essentially southward extensions of the "cold waves" of the United States. Four weather maps, illustrating typical conditions for the production of "northers" in the Canal Zone, are given.

R. DEC. WARD

EUROPE

Illustrations of Seasonal Migration from Switzerland and the Dinaric Countries. The pastoral nomad is a familiar figure in geographical literature; much less so the *transhumant*, though his life is particularly interesting from a geographical point of view. The transhumant is distinguished by the periodicity of his migrations and his possession of a fixed home. His economy is related to mountainous relief, and its chief determinant is climate. The conditions under which transhumance obtains notable proportions are defined by De Martonne as the proximity of high mountains habitable for five months of the year and plains semi-steppe in character subjected to summer drought. Such conditions may be found in the mountain borders of the Mediterranean. De Martonne himself made a special study of transhumance in the southern Carpathians (*La vie pastorale et la transhumance dans les Karpates méridionales*, "Zu Friedrich Ratzels Gedächtnis," [Ratzel memorial volume], Leipzig, 1904), where the movement is persistent and long established. The Spanish meseta affords typical areas of transhumance though the recent improvement of economic conditions has greatly lessened its sway (see André Fribourg: *La transhumance en Espagne*, *Ann. de Géogr.*, Vol. 19, 1910, with 2 maps; article abstracted by O. Quelle and maps combined into one in *Petermanns Mitt.*, Vol. 56, II, 1910). The term transhumance indeed is of Spanish origin (*trashumar*, from *trans* and *humus*). Transhumance is known from the Iberian to the Anatolian peninsula and into Armenia and Persia, though in the two last regions, where it is practiced by Kurds

and Tatars, it approximates to true nomadism. The Atlas region again is admirably adapted for transhumance, and here should be remarked the recent change from nomadism to this higher form of pastoral migration as the country has become peaceable under French rule. The way in which economic, social, and other strictly non-geographic factors enter into the control of transhumance is exceedingly interesting, but it is the geographic factors that are of first importance.

An illustration of transhumance in a region where it is combined with highly developed agricultural exploitation is given in a recent paper by Stanislas Lencewicz (*La transhumance dans le val de Réchy*, *Bull. Soc. Neuchateloise de Géogr.*, Vol. 25, 1916, pp. 106-121). The narrow, deep valley of Réchy, a left tributary of the Rhone in the canton of Valais between the Val d'Hérens and the Val d'Anniviers, has a long winter and is not inhabited permanently. The villages at the mouth enjoy only a scant precipitation (18 inches per year), and the inhabitants have recourse to the waters of the Rhone for irrigation. During the summer they use the pasturage on the glacially moulded valley shoulders and glacial cirques. These pasturages and their chalets are communal property; the business of the summer herding is also a matter of communal organization. The migration begins in May and by successive stages reaches the upper pastures, about 8,000 feet in elevation, at the beginning of July, to be completed during the second half of September. The herds are almost exclusively of cows, the making of cheese and butter being the primary object of the migrations. These products are divided among the individual owners according to the number and value of their herds.

On the westward slopes of the Dinaric Alps summer drought is intensified by the extreme development of karst phenomena. Transhumance is very widely distributed. Various forms of the migrations are described by Jevto Dediđer in the *Annales de Géographie* for September 15, 1916 (*La transhumance dans les pays dinariques*, Vol. 25, pp. 347-365). Towards the beginning of June, when the lower slopes of the Adriatic flanks of the Dinaric Alps, sunbaked and waterless, begin to be insupportable, the flocks of sheep are taken up to the summer pastures on the high mountains of Bosnia, Herzegovina, and Montenegro, three to six days' journey from the permanent villages. On the way the flocks and their herders, who are supplied by the private pastoral organizations, pass through an intermediate zone where live pastoralists who are not under the necessity of migrating in the summer. In the mountains a stay of about three months is made, until the first abundant rains of autumn, when return is made to the village. Of this simple form there are many modifications, dependent on morphological, hydrographic, and climatological variations in the area. Again, more complex causes account for such extremes as are represented by an "atavistic," or ancient surviving type, where a group is entirely pastoral and where all its members follow the annual migrations, to "decadent" forms obtaining in the fertile basins or *polyes*, where now are very few flocks. In some of the latter cases amelioration of the agrarian situation by the Ottoman government in the period 1850-60 led to increased agriculture and a more sedentary life.

On the eastern slopes of the Dinaric Alps, where approach to Central European types of climate and vegetation exists, transhumance takes on an entirely different form. Migrations are made at different seasons and are made down to the plains, instead of up to the mountains. On this side are heavier winter snows; the beasts are stabled during the winter—whence fodder becomes a problem. In autumn, after the summer harvests are gained, the flocks are taken to the plains, to return with the first fall of snow. They set out again at the end of February, are pastured in the plum orchards, and return about the end of April.

AFRICA

An African Scourge: The Tsetse Fly. Thirty-four years ago Europe definitely assumed the responsibility of the African problem. Today the issue of that problem is acute, and great is the need for an appreciation of the factors contributing to its peculiar difficulties. Not the least of these is the character of tropical Africa as a storehouse of deadly germ diseases. Notoriety in particular attaches to those diseases transmitted to man and beast by the tsetse fly. In this rôle and in virtue of its wide distribution the tsetse becomes one of the most serious barriers to progress. As early as 1851 Livingstone recognized the tsetse as "the scourge of Central Africa" (letter in *Bull. Amer. Geogr. Soc.*, Vol. 1, 1852-54, pp. 47-60). The characterization is as true today. "It [the tsetse] offers European civilization what is perhaps the most considerable obstacle against it," writes Roubaud in 1913 (E. Roubaud: *Les mouches tsétsés en Afrique Occidentale Française*, *Ann. de Géogr.*, Vol. 22, 1913). "The presence of the tsetse fly constitutes one of the greatest of the obstacles to our development of vast areas," says Fox of Northern Rhodesia (*Geogr. Journ.*, Vol. 48, 1916). Many specific instances might be quoted to confirm these statements. Perhaps the most striking is the case of the late ravages of

sleeping sickness in Uganda. The disease entered the country from the Congo in 1901-02. At the end of 1903 the deaths from it numbered 90,000. Whole villages were wiped out and great tracts of fertile land, such as the Busoga shores of Victoria Nyanza, were desolated (geographical summary of the "Report on the Measures Adopted for the Suppression of Sleeping Sickness in Uganda" by Sir Hesketh Bell, *Colonial Repts. Misc. Cd.* 4990, 1909, in *Scottish Geogr. Mag.*, Vol. 26, 1910). Vast areas in Angola and the Congo where the disease is truly endemic have likewise been depopulated. "The difficulty in obtaining food from the natives is hardly credible to those who regard the Congo banks as populous and fertile; if they were more populous they could easily be made productive" (George Grenfell: The Upper Congo as a Waterway, *Geogr. Journ.*, Vol. 20, 1902). The maps of the Sleeping Sickness Bureau, London, 1909 (reproduced in *Petermanns Mitt.*, Vol. 56, II, 1910, Pl. 11), show the prevalence of the disease along the Congo mainstream and the Ubangi and suggest a reason for the lack of population. Density of population bears an important relation to future development in Central Africa. Already difficulty has been experienced in obtaining labor for the Katanga copper mines. Along the Lufira and other tributaries of the Lualaba draining the Katanga plateau sleeping sickness has carried off large percentages of the population (see maps accompanying the report by F. O. Stohr: La maladie du sommeil au Katanga, London, 1912). The ban on cattle-raising in tsetse fly zones is an incalculable loss not only locally to natives and white pioneers but in wider questions of transportation. Before the tsetse-haunted belt of equatorial forest the caravans of Islam were halted; Islamic influence, so dominant in North Africa, does not pass beyond the Sudan. In the late campaign against German East Africa the Rhodesian front suffered disability under the lack of animal transport. The corollary to this restriction is an expensive demand on human portage in regions where labor is not superabundant.

Geographically the greatest interest in the tsetse problem lies in the distribution of the fly and the physical factors controlling that distribution. The two most important species of tsetse (*Glossina*) are *palpalis* and *morsitans*. The former is especially associated with sleeping sickness, the latter with the cattle sickness, locally known as *nagana*, though it has lately been proved that *morsitans* can also act as transmitter of a form of sleeping sickness. The distribution of *Glossina* is governed by conditions of climate, vegetation, and surface water (J. Schwetz: Preliminary Note on the Distribution of *Glossina palpalis* in the District of Lomani, Belgian Congo, *Annals Tropical Medicine*, Vol. 9, 1915, Liverpool). All tsetse demand shade. *Glossina morsitans* requires a certain degree of freshness and is not dependent on the immediate proximity of water. *Glossina palpalis* requires a warm damp atmosphere and the immediate presence of water. The limits of its altitudinal range appear to be about 4,000 or 4,500 feet. This species may be found anywhere in stretches of true equatorial forest where there is water, though it may further be carried into the savana regions by the gallery forests. Sleeping sickness, therefore, is characteristically a disease of western Africa—of the Guinea coast and the Congo.

Glossina morsitans, source of the cattle sickness, has a far wider distribution. It is found occupying belts of the savana country. The reason for restriction to these well-defined belts is not understood. Certainly *morsitans*, like other species, is highly sensitive to weather conditions, and it follows seasonal migrations within the limits of the belts, but as yet no satisfactory explanation of its range is forthcoming (Cuthbert Christy: Tsetse Flies and Fly-Belts, *Annals Tropical Medicine*, Vol. 11, 1917-18). Another vexed question concerns the relation of big game to the tsetse and the spread of disease. By certain authorities big game is considered as a reservoir of virus and its destruction or confinement to reservations has been seriously urged (Minutes of Evidence Taken by the Departmental Committee on Sleeping Sickness, *Blue Book Cd.* 7350, London, 1914). More practical seeming proposals have been put forward for elimination of the fly by clearing of rank natural vegetation. But to be economically possible such a measure requires to be followed by continued cultivation and hence must be of slow growth. Meanwhile for a less distant solution the problem demands further research and—it is essentially an international problem—co-operation between the nations responsible for the progress of Central Africa.

PHYSICAL GEOGRAPHY

Recent Developments in the Theory of Glacial Variations. Professor Raoul Blanchard, analyzing the hydraulic regimen of the Pre-Alps and the Great Alps (*Recueil des Trav. de l'Inst. de Géogr. Alpine*, Vol. 5, 1917, Grenoble) shows the influence of glacial sources of stream flow: the great contrast between stream regimens lies between the rain-fed streams with summer minimum and the glacier-fed streams with summer maximum. The sources of both streams are liable to fluctuations. The glaciers advance

and retreat; their variation is reflected in stream discharge. Today, when we know the Alps as the great storehouse of hydro-electric power, stream discharge is a matter of practical importance. As Charles Rabot says at the conclusion of his paper "Récents travaux glaciaires dans les Alpes françaises" (*La Géographie*, Vol. 30, 1914-15), the study of glacial variations is far from being merely one of academic interest.

In the autumn of 1913 of one hundred glaciers of the Swiss Alps 33 were in a state of advance, 8 were stationary, 59 were in retreat: in 1916 there were 64 in advance, 8 stationary, and 28 receding. Variation is not simultaneous; nor from an examination of regional distribution is there any apparent law governing this differential variation. In 1914-15 the Great Aletsch Glacier retreated 6 meters, while its close neighbor the Fiesch advanced 11 meters. The regular series of observations now being carried out on the Alpine glaciers show that the problem of glacial variation is not so simple as it appeared to be when Forel in 1900 essayed to fix its laws. Forel enunciated as one of these laws the statement that glacial variations are changes of volume and not of form. The volume of a glacier may be said to represent the balance between the two factors regulating glacial economy, nivation and ablation, that is to say ultimately between precipitation and temperature. The volume of the glacier is distributed between its upper part, the collector, where nivation exceeds ablation, and the dissipator, or lower part, where ablation exceeds nivation. Glacial flow has been regarded as continuous; hence an increased volume in the collector has supposedly been followed by increased volume in the dissipator. If this be so it is difficult to explain the lack of uniform response of glaciers in the same region to the same climatic variations. But lately careful observations and refined measurements have demonstrated the occurrence of movements affecting the form as well as the volume. In particular glaciers, besides the slow forward movement of the glacial body, waves of intumescence have been observed to pass through the mass, and this wave movement has in all cases been accompanied by general deformation and crevassing of the glacier front. The phenomenon was admirably observed in Yakutat Bay in 1899, when in a few months the unbroken, moraine-covered valley glacier was changed to a sea of crevasses. This development, accompanied by a great movement of advance, had been preceded by an unusually violent earthquake. A probable explanation sees the cause in the dislodgment of enormous masses of ice from the surrounding heights onto the glacier, leading to a sudden forward thrust. The idea of the sudden forward movement advocated in this abnormal case may be carried to the interpretation of normal cases. Nivometric studies in the Alps confirm the conception of discontinuous flow; the slow accumulation in the collector, sudden discharge from it. According to such a conception a glacier will not necessarily react at once to climatic variation. If, however, the variation be sustained, the glacier must ultimately respond; whence during well-marked periods of climatic variation we find all the glaciers of a region behaving similarly. The great Alpine extensions at the end of the sixteenth century, at the beginning and in the middle of the nineteenth century, between 1810 and 1825 and towards 1855, were all universal (P. L. Mercanton: *Les variations des glaciers actuels*, *Rev. Gén. des Sci.*, Nov. 30, 1917, pp. 631-636; translated in the *Scientific American Suppl.*, March 30, 1918. See also A. G. Ogilvie: *Some Recent Observations and Theories on the Structure and Movement of Glaciers of the Alpine Type*, *Geogr. Journ.*, Vol. 40, 1912).

ECONOMIC GEOGRAPHY

A Persistent Superstition: The Divining Rod. There has been recently quoted the tale of an Australian sapper who by means of the divining rod discovered water on the arid beaches of Anzac. Under less dramatic circumstances the method is still customary in the sheep-farming regions of Australia and in other regions where water is scarce. It has been the subject of recent controversies in western Europe, and in this country it is credited to an extent that has led the U. S. Geological Survey to issue a special warning (Arthur J. Ellis: *The Divining Rod: A History of Water Witching*, *U. S. Geol. Survey Water-Supply Paper 416*, 1917). This, however, is not the first condemnation published by the Survey. In *Mineral Resources of the United States for 1882* the superstition was attacked by R. W. Raymond. Raymond pointed out that the surface signs of ground water are easily recognized by the experienced observer, who may acquire an empirical knowledge remarkable for its unconscious acumen; he instances the seemingly uncanny skill of the Indian of the desert West and the art learned from him by the frontiersman. Again, in the case of the artesian well, if a person "has sufficient practical judgment to decide that a certain area or line would probably be suitable for boring, he is pretty sure to be safe in selecting any point of it." With the discredited divining rod go the recent devices described in *Water-Supply Paper 416* under the category of "mechanical water finders." They are the latest expressions of a remarkably

persistent superstition the history of which has given rise to a considerable literature: the bibliography given covers 28 pages!

Crops and Temperature. The relations between crops and weather conditions are highly complex. Many factors enter into the problem. These are not meteorological controls alone. They are also soil conditions, the character of the seed, the time of planting, the methods of cultivation, and the like. Hence the determination of definite relationship is difficult, often impossible. Special attention has lately been paid to rain-fall controls. A recent study in agricultural meteorology by D. A. Seeley deals with the temperature element (abstracted in *Monthly Weather Rev.*, July, 1917, pp. 354-359). What the author has in view is the determination of the heat requirements of each crop and a method of evaluating air temperature records in terms of their efficiency to meet these requirements. The method most generally employed is the "summation process," so-called. This consists in adding together the mean daily air temperatures during the life phase of a crop in order to find the thermal requirement. The results differ widely from year to year. Van't Hoff's law, introducing the exponential method, does not take account of the optimum temperature for growth and fails to produce consistent results. Livingston's "physiological index" method of evaluating temperatures, while "based on a reasonable footing," is not satisfactory. The author believes that the temperature of the plant itself deserves more consideration. This is much higher than the air temperature, in sunshine. Observations at East Lansing, Mich., in 1915-16, show that the excess of plant temperature over air temperature averages about 15° in clear, 10° in partly cloudy, and less than 1° in cloudy weather. Curves expressing plant-growth rates and plant temperatures show more decided parallelisms than appear when other temperatures are considered. A formula is evolved for use in determining the effectiveness of air temperature in promoting crop development.

R. DEC. WARD

GEOGRAPHICAL NEWS

OBITUARY

HUBERT HOWE BANCROFT, the noted historian, died at Walnut Creek, Cal., near San Francisco on March 2 at the age of 86. He is best known for his "History of the Pacific States of North America" (34 vols., 1882-90; preceded by "The Native Races of the Pacific States of North America," 5 vols., 1874-76). The writing of this monumental work was only made possible by a system of card indexing he devised to digest the enormous amount of source material and the training in its use of a corps of research assistants and collaborators. Mr. Bancroft was a Fellow of our Society.

PROFESSOR PAUL VIDAL DE LA BLACHE of the University of Paris, the dean of French geographers, died on April 5 at the age of 73. Professor Vidal de la Blache, who numbered most of the leading geographers of France among his pupils, may fitly be termed the father of the modern French school of geography, a school which, in its combination of scientific accuracy with a sense of proportion, has made all geographers its debtors. Among his leading works may be mentioned: the "Atlas Général Vidal-Lablache," first appearing in 1890 and kept up to date in succeeding editions, of the maps of which it has truly been said that many "are marked by great ingenuity of conception, and several are unique to this atlas"; the admirable "Tableau Géographique de la France," published as the introductory volume of Lavis's "Histoire de France" in 1903 and also separately in 1908; and his last work "La France de l'Est: Lorraine-Alsace," published in 1917, which was abstracted in *extenso* in the *April Review* (Vol. 5, 1918, pp. 328-329). A detailed account of his life and achievements, by his son-in-law, Emmanuel de Martonne, and Professor Lucien Gallois, will be found in the "Geographen Kalender" for 1910 (Justus Perthes, Gotha). Another, by Professor Gallois, appears in the latest number of the *Annales de Géographie* (May 15, 1918, pp. 161-173). Professor Vidal de la Blache was awarded the Charles P. Daly Medal of this Society in 1915.

CORRESPONDENCE

To the Editor of "The Geographical Review":

The undersigned trusts that it will be possible to print the following reply to Professor Mark Jefferson's criticism in the November *Review* (Vol. 4, 1917, pp. 399-400) of his article on "The Monsoon." Professor Jefferson writes "Mr. Wallis bases his objections on alleged facts" and appeals to the evidence in Dr. Herbertson's well-known paper published in 1901 (The Distribution of Rainfall Over the Land) and apparently ignores the illustrative data which are appended to the article under criticism. We have, therefore, an apparent conflict of authorities, so perhaps I may be allowed to specify more

definitely those on which my statements are based. Firstly, with reference to the winds, the authority is the monthly pilot charts of the Indian Ocean published by the British Admiralty. Secondly, with regard to rainfall, the authority is "Monthly and Annual Rainfall Normals" published as one of the *Memoirs* of the Indian Meteorological Department (Calcutta, 1913).

Now, consider the "alleged facts": (i) "the rains fall with conspicuous suddenness in June": this refers to the Bombay province and the west coast of the Deccan. Let me refer to the *Memoir*; pp. 118-119 are the first pages dealing with Bombay Province. On those pages there are the facts for thirty stations, and none of these has a record for less than twenty years. The average rainfall for these places is: April, 0.64 inches; May, 2.07 inches; June, 29.96 inches; and the on-shore wind reaches this coast throughout these three months. (ii) "Similarly in Burma and Assam the on-shore winds precede the coming of the rains by weeks." In Assam there are 63 stations with records over at least twenty years. In none of these does the rain in February exceed 3.3 per cent of the total annual fall; nor in March 6.6 per cent of the annual fall, and in all of them the wettest month, which may be June, July, or August, is marked by a precipitation which equals 16.6 per cent of the year's rainfall. In Burma, out of 46 stations 7 have two rainfall maxima, before and after a dry period in July-August; the others are similar to the stations in Assam. The rains beginning in late April or early May are preceded by the southwest winds which begin in late March, or early April. (iii) "The northeast trades precede the rains on the Madras coast." In the first place it may be mentioned that, although the north Madras coast trends northeast-southwest, the northeast trades are not entirely parallel to the coast, since the winds blow from easterly quarters and are frequently on-shore winds. The winds begin in October, and it is essential to distinguish between the coastal area with its late-season rains, and the inland area, which is affected by the normal summer rain influence. On the coast the rains come in late October and November, which is later than the beginning of the winds. (iv) "The monsoon as an on-shore wind is fiercest there, yet Sind is arid." This statement will serve to illustrate the main argument of my article, to which Professor Jefferson does not refer. The suggested explanation may be briefly summarized: (a) The desert of Thar is in the desert latitudes, e. g. the Sahara. (b) The equatorial edges of hot deserts receive their rains with an intense summer maximum. (c) The rainfall facts concerning Sind agree with those for other places similarly situated on the equatorial edges of a hot desert. (d) If the monsoon winds did not blow, Sind ought—on account of its location—to have precisely the type of rainfall distribution which it receives. (e) For this and other reasons, I suggest that Indian rains are normal to the latitude.

Professor Jefferson's criticism, "But Sind is low and level, and it is not on low and level lands, especially when heated by a zenithal sun, that monsoon winds are supposed to yield their rainfall," is open to two objections: first, that Sind is north of the tropic and that the "zenithal sun" is scarcely a correct term to apply to Sind in July and August; and, secondly, low and level lands such as the Ganges delta and the northern shores of Australia do receive alleged monsoon rains from on-shore winds in the hottest months. This last notion, that the Ganges delta is very wet while the Indus delta is arid, is an illustration of the normal character of the rainfall of India; since everywhere the area of summer rains tends to creep round the eastern edges of the hot deserts polewards, so that these eastern edges are as a rule wetter than districts in approximately the same latitude farther west.

These remarks have run to considerable length, which may be, perhaps, excused under the circumstances, as Professor Jefferson's criticisms appear to be invalidated by the weaknesses inherent in the authorities to which he refers. Dr. Herbertson's paper is scarcely adequate as a basis for criticism of a detailed study, the more especially as the data then available were scanty in comparison with those accumulated since 1901.

Very truly yours,
B. C. WALLIS

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

General

HUEBNER, G. G. **Agricultural commerce: The organization of American commerce in agricultural commodities.** xv and 406 pp.; maps, diagrs., bibliogr., index. D. Appleton & Co., New York and London, 1916. \$2.25. 8 x 5½.

This is a volume summarizing the existing methods of marketing the chief agricultural products of the United States, with especial emphasis on the methods adopted for grain, cotton, live stock, wool, tobacco, and fruit. The methods of speculative exchanges, the organization of the crop reports, the financing of crops, and the methods of establishing prices are also fully presented.

Certain topics at the moment of much public interest, as for instance the methods of handling the potato crop and dairy products, are not included. In so compact and inclusive a volume adequate space cannot be given for a full presentation of such topics as rural credits and farm loan systems.

The student of economic methods will find in this volume a wealth of reliable information brought together in a usable form. The inquiring farmer who desires to know more as to the why of the "35 cent dollar," which is so universal a query, will secure enlightenment through a reading of the pertinent chapters in this volume. The general reader unaware of how efficiently and practically the greater farm products are handled will gain from this volume a renewed confidence in established grades, in official inspection of agricultural products, and in the methods of making farm products readily available for the consumer at home or abroad.

RICHARD ELWOOD DODGE

MOULTON, H. G. **Waterways versus railways.** xviii and 468 pp.; maps, diagrs., bibliogr., index. (Hart, Schaffner & Marx Prize Essays, XIII.) Houghton Mifflin Co., Boston and New York, 1912. \$2.00. 8½ x 5½.

Although published six years ago, this remarkably clear and comprehensive analysis of the waterway problem well deserves being freshly called to the attention of students of transportation and commercial geography. The usual supposition in regard to waterway transportation is that it is much cheaper than railway transportation, especially for bulky freight. A painstaking study of the traffic on inland waterways and the actual costs of freight transportation, made not only in this country but in Europe, brought the rather startling conclusion that the development of inland waterways, whether by canals or rivers, except under a few most exceptional circumstances has little economic justification when all factors are taken into consideration. "While canals satisfactorily served the needs of an earlier period, their day, like that of the sickle, the hand-loom, and the spinning-jenny, is now forever past." "To make canals an integral part of a national transportation system, whether for the carriage of high-class or low-grade freight, it matters not, is to attempt to turn backward the clock of time" (p. 456).

The marshaling in this large volume of the abundant evidence that supports these conclusions is, on the whole, most convincing. The author has brought together an enormous amount of information concerning the waterways of Europe and America, their physical conditions, costs, traffic, etc. The first five chapters deal with the revival of interest in waterways in the United States, the geographic and economic factors underlying waterways development, and the reasons for the rise and decline of water transportation in this country. There follow nine chapters descriptive of the canals and river transportation systems of Europe. Of particular interest is the account of German waterways, which are so often used as examples of the advantages of waterway development. Except on the well-favored Rhine, waterway traffic in Germany, the author shows, has been developed through the aid of a governmental policy that compels enormous taxation. In Germany, as in Great Britain, France, and the United States, canals and even canalized rivers have cost enormously more per mile than railroads and their full equipment. Cost of transporting freight by water is substantially greater than by rail.

If in densely populated European countries waterway transportation has proved

uneconomical when compared with the railroads, what justification can there be for it in the United States? This the author answers in the last five chapters of the book. That most of our projects cannot be justified on the ground of transportation advantages alone seems well established. It might be that development of river transportation in connection with other conservation purposes, such as developing of water power or flood control, would be justified. This, however, would require a separate investigation which the author does not attempt. The book deserves a most careful reading by all who are interested in the problem of transportation in this country. G. B. ROORBACH

ALEXANDER, W. H. **Thunderstorms.** Maps, diagrs., bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 55-75 (discussion, pp. 74-75). Washington, D. C., 1917. [Relating especially to the United States.]

BEALS, E. A. **Forecasts of weather favorable to an increase of forest fires.** Maps, bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 257-270 (discussion, pp. 269-270). Washington, D. C., 1917. [United States.]

BLAIR, W. R. **Some results of aerological observations.** Diagrs. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 632-641. Washington, D. C., 1917. [United States.]

COX, H. J. **Influence of the Great Lakes upon movement of high and low pressure areas.** Maps. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 432-459 (discussion, pp. 472-473). Washington, D. C., 1917.

FOLKMAR, DANIEL. **The United States census of immigrant stocks.** *Proc. 19th Internatl. Congr. of Americanists Held at Washington, Dec. 27-31, 1915*, pp. 576-581. [Smithsonian Institution], Washington, D. C., 1917.

FOLKMAR, DANIEL. **The United States census of immigrant stocks.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 1, Section 1: Anthropology, pp. 15-22 (discussion, pp. 20-22). Washington, D. C., 1917.

FRANKENFIELD, H. C. **Fog forecasting in the United States.** Maps, diagrs. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 659-670. Washington, D. C., 1917.

FRANKENFIELD, H. C. **Sleet and ice storms in the United States.** Maps. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 249-257 (discussion, pp. 252-257). Washington, D. C., 1917.

HENRY, A. J. **The river service of the Weather Bureau.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 671-675. Washington, D. C., 1917.

HODGE, F. W. **What the United States Government has done for the science of anthropology.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 1, Section 1: Anthropology, pp. 168-174. Washington, D. C., 1917.

HOPKINS, A. A., edit. **Our country and its resources.** 598 pp.; maps, diagrs., ill., index. (Scientific American Ser.) Munn & Co., Inc., New York, 1917. 8 x 5½. [A guide book of semi-official character.]

HRDLIČKA, ALEŠ. **Anthropology of the Chippewa.** Ills. Extract from the "Holmes Anniversary Volume," pp. 198-227. [Smithsonian Institution], Washington, D. C., 1916. [Introductory paragraphs on Indian population of the United States, now numbering (June 30, 1915) 333,000, of which 174,000 are given as full bloods. Author thinks the correct number is less than 100,000. Assimilation of Indians by whites is proceeding at a steadily increasing rate. Main part of paper relates to the technical anthropology of the Chippewas.]

HRDLIČKA, ALEŠ. **The old white Americans.** *Proc. 19th Internatl. Congr. of Americanists Held at Washington, Dec. 27-31, 1915*, pp. 582-601. [Smithsonian Institution], Washington, D. C., 1917.

MEXICO AND CENTRAL AMERICA

— **Nicaragua: General descriptive data.** 31 pp.; ill. Pan American Union, Washington, D. C., 1915.

ORDÓÑEZ, E. **Las principales unidades geográficas mexicanas y la distribución de los criaderos minerales.** *Bol. Minero*, Vol. 1, 1916, No. 3, pp. 65-66. [See the note on the introductory article listed in the *Review*, Vol. 1, 1916, pp. 313-314.]

— **Panama: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

— **Panama Canal, Annual report of the Governor of the, for the fiscal year ended June 30, 1916.** xxiii and 637 pp.; maps, diagrs., ills. Washington, D. C., 1916. [Contains the full text of the preliminary report upon the possibility of controlling the land slides adjacent to the canal, of which a summary note appeared in the *Review*, Vol. 1, 1916, p. 373.]

PECCORINI, ATILIO. **Estudios sismológicos: Mis exploraciones en el Volcán de Izalco.** ills. *Diario Latino*, 1915, Dec. 7, parts of pp. 1 and 6. San Salvador.

PORRAS, BELISARIO. **Excursión á la costa de San Blas en Panamá.** ills. *Bol. Real Soc. Geogr.*, Vol. 58, 1916, No. 4, pp. 401-412. Madrid.

RAMÍREZ F. FONTECHA, A. A. **Noticia geográfica y estadística de la República de Honduras, Centro América.** *Proc. 2nd Pan Amer. Sci. Congr.*, Dec. 27, 1915, to Jan. 8, 1916, Vol. 11, Section 9: Transportation, Commerce, Finance, and Taxation, pp. 555-616. Washington, D. C., 1917.

— **República Mexicana, La: Reseña geográfica y estadística.** (1) Coahuila. 49 pp.; map, ills. (2) Chihuahua. 26 pp.; map, ills. (3) Chiapas. By Enrique Santibáñez. 29 pp.; map, ills. (4) Baja California. By León Diguët. 40 pp.; maps, ills., bibliogr. C. Bouret, Paris and Mexico, 1900-12. Each 13 x 10. [A praiseworthy compilation of general geographic interest. The maps are moderately well done and the photographs are exceptionally good. The brochure on the peninsula of Lower California is the best of the four and is illustrated by photographs that quite surpass any other collection yet published on this region. They tell a story in themselves. The hachure sketches of Magdalena Bay and other natural harbors are among the best to be had. Carried out for the whole of Mexico the plan would yield a series of state monographs that would give a better geographic picture of Mexico than any other publication.]

— **Salvador: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

SANDBERG, H. O. **Central America—cattle countries.** ills. *Bull. Pan Amer. Union*, Vol. 44, 1917, No. 4, pp. 449-464.

THAYER, W. N. **The physiography of Mexico.** Map, diagrs. *Journ. of Geol.*, Vol. 24, 1916, No. 1, pp. 61-94.

— **Tres Marías, Informe sobre las riquezas naturales de las islas.** *Bol. Oficial de la Secretaria de Fomento*, Vol. 2, 1917, No. 1, pp. 101-105. Mexico. [This island group is off the coast of Tepic, Mexico.]

WATERMAN, T. T. **Bandelier's contribution to the study of ancient Mexican social organization.** Bibliogr. *Univ. of California Publs. in Amer. Archaeol. and Ethnol.*, Vol. 12, 1917, No. 7, pp. 249-282.

WICKER, C. F. **The Pearl Islands of the Pacific.** Map, ills. *Pan-Amer. Mag.*, Vol. 24, 1917, No. 5, pp. 224-234. [In the Gulf of Panama.]

ZARATE, J. C. **Las salinas de México y la industria de la sal común.** 71 pp.; map, diagr., bibliogr. *Anal. del Inst. Geol. de México No. 2.* Secretaria de Industria y Comercio, Mexico, 1917. [With a map showing the distribution of salinas.]

ZINN, A. S. **Construction of a narrow gauge railway in the Republic of Panama.** Map, diagr., ills. *Journ. Western Soc. of Engineers*, Vol. 21, 1916, No. 9, pp. 766-783 (discussion pp. 778-783). [This railway, the Chiriqui, was completed July, 1916.]

WEST INDIES

ROOSEVELT, THEODORE. **Where the steady trade-winds blow.** Map, ills. *Scribner's Mag.*, Vol. 61, 1917, No. 2, pp. 169-188.

An intimate description of scenes and people in the Lesser Antilles, including Georgetown in British Guiana. The sympathy and enthusiasm of the descriptive passages remind the reader of Lafcadio Hearn's colorful sketches in "Two Years in the French West Indies," one of the brightest books on the West Indies ever written. Colonel Roosevelt's word pictures of towns and landscapes are good geography as well as good literature. Of special interest are his references to the Elizabethan sea dogs who fought their way to enduring glory by sacking towns and harassing the treasure galleons of the Spanish Main; his reference to the strange problem exhibited by the honest and hard-working people of the island of Saba, who are descendants of buccaneers; and his significant outline of the racial and political problems of the West Indies that confront the statesmen of our time. The crime of slavery is fundamentally responsible for the

greatest problem of all. For example: "For over a half-century in the West Indies the negro has done far better in the islands where the government has been, at least at the top, under predominantly white control than he has done in Hayti, whence the whites were expelled with fire and sword a century and a quarter ago. The whites of Hayti came to complete and utter destruction because their forefathers had introduced slavery, so that for generations they ate their bread at ease in the sweat of other men's brows; and then the blacks of Hayti avenged this crime by a crime of their own as monstrous and as short-sighted, and by so doing condemned their own descendants to lag behind or go backward, while their fellows in neighboring regions struggled painfully upward and onward." Grenada is reputed to be in healthy contrast. It "has traveled farthest along the road on which most of the West Indian islands are traveling. Her resident white population, non-official, has almost vanished. It is an island predominantly of black or colored peasant proprietors. They are doing well, thanks to the orderly justice maintained by the representatives of the British Government; they are loyal to the British flag, and in this war have sent nearly five hundred men to join the British army. It is well to face facts. As yet most of the independent states fronting the Gulf of Mexico and the Caribbean Sea have failed to make even a beginning in the path of progress trodden by such South American commonwealths as Brazil, Uruguay, Argentina, and Chile. In the lands under English, French, and American (United States) control the conditions of present life and the prospects for the future are immeasurably better for the people as a whole, and especially for the poorer people, than in most—not all—of the neighboring so-called 'independent' states."

— **Cane sugar industry in America, The commencement of the, 1519-1538 (1563), Documents** [on]. Contributed by I. A. Wright. *Amer. Hist. Rev.*, Vol. 21, 1916, No. 4, pp. 755-780. [Reproduction of nineteen documents found by Miss Wright in the Archivo General de Indias in Seville, with introduction and annotations. The locality dealt with is Santo Domingo.]

— **Cuba: General descriptive data.** 31 pp.; ill. Pan American Union, Washington, D. C., 1916.

— **Dominican Republic: General descriptive data.** 31 pp.; diagrs., ill. Pan American Union, Washington, D. C., 1917.

FASSIG, O. L. **Tropical rains—their duration, frequency, and intensity.** Maps, diagrs. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 460-472. Washington, D. C., 1917. [A comparison of observations in a representative area in the tropics (Porto Rico) and one in the middle latitudes (Maryland).]

FLEAGLE, F. K. **Social problems in Porto Rico.** vii and 139 pp. D. C. Heath & Co., Boston, New York, Chicago, 1917. \$1.00. 7½ x 5.

GRIFFIN, WATSON. **Canada and the British West Indies: Report on the possibilities of trade under the preferential tariff agreement.** 173 pp.; maps, ill. *Suppl. to Weekly Bull., Dept. of Trade and Commerce*, Ottawa, 1915. [Chapter 8 abstracted in the *Geogr. Review*, Vol. 4, 1917, p. 146.]

GUTIÉRREZ-LANZA, MARIANO. **El clima de Cuba.** Diagrs. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 132-172 (discussion, 171-172). Washington, D. C., 1917.

— **Haiti: General descriptive data.** 31 pp.; ill. Pan American Union, Washington, D. C., 1916.

HALL, MAXWELL. **Notes of hurricanes, earthquakes, and other physical occurrences in Jamaica up to the commencement of the Weather Service, 1880, with brief notes in continuation to the end of 1915.** 8 pp. [*Weather Rept.*] No. 455. Kingston, 1916.

HALL, MAXWELL. **The Jamaica hurricane of October 3, 1780.** Maps. *Quart. Journ. Royal Meteorol. Soc.*, No. 182, Vol. 43, 1917, pp. 221-225.

HENDERSON, J. B. **The cruise of the Tomas Barrera: The narrative of a scientific expedition to western Cuba and the Colorados reefs, with observations on the geology, fauna, and flora of the region.** ix and 320 pp.; maps, diagrs., ill., index. G. P. Putnam's Sons, New York and London, 1916. \$2.50. 8 x 5½.

MILLÁS Y HERNÁNDEZ, J. C. **Génesis y marcha de los huracanes antillanos.** Bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 42-55. Washington, D. C., 1917.

MÖRZER BRUYNS, A. G. **De vooruitgang van Porto Rico onder Amerikaansch beheer, een toekomstbeeld voor onze Bovenwindsche eilanden.** Ills. *Tijdschr. voor Econ. Geogr.*, Vol. 7, 1916, No. 4, pp. 160-166.

MURPHY, L. S. **Forests of Porto Rico, past, present, and future, and their physical and economic environment.** 99 pp.; maps, diagrs., ills., bibliogr. *U. S. Dept. of Agric. Bull. No. 354.* Washington, D. C., 1916. [Abstracted in the *Geogr. Review*, Vol. 3, 1917, pp. 68-69.]

TODD, W. E. C. **The birds of the Isle of Pines.** Map, ills., bibliogr. Reprinted from *Annals Carnegie Museum*, Vol. 10, 1916, Nos. 1-2, pp. 146-296. [The introduction to the report includes a geographical sketch of the area. The Isle of Pines, 800 square miles in extent, is divided into northern and southern parts by the Cienaga de Lanier, a great fresh-water morass resembling the Florida Everglades in its general character. The northern portion, a level gravelly plain broken by a number of isolated heights, has been in part cleared and given over to the cultivation of citrus fruits and pineapples. The inaccessible southern portion is practically uninhabited and is still very imperfectly known. The report is accompanied by a map.]

TREUDLEY, MARY. **The United States and Santo Domingo, 1780-1866.** Bibliogr. *Journ. of Race Devel.*, Vol. 7, 1916, No. 1, pp. 83-145; No. 2, pp. 220-274. [With an introductory chapter on trade relations between the two countries during the eighteenth century.]

VAUGHAN, T. W. **Study of the stratigraphic geology and of the fossil corals and associated organisms in several of the smaller West Indian islands.** Extracted from *Year Book Carnegie Inst. No. 14 for 1915*, pp. 368-373. Washington, D. C.

VAUGHAN, T. W. **The results of investigations of the ecology of the Floridian and Bahaman shoal-water corals.** Reprinted from *Proc. Natl. Acad. of Sci.*, Vol. 2, 1916, Feb., pp. 95-100.

EUROPE

AUSTRIA-HUNGARY

BATTISTI, CESARE. **Il Trentino: Cenni geografici, storici, economici, con un' appendice su l'Alto Adige.** 2nd edit. 64 pp.; maps, ills., index. Istituto Geografico De Agostini, Novara, 1917. L. 3. 10 x 6½.

No more fitting memorial than this summary of knowledge of the Trentino could bear the name of Cesare Battisti, who was made to stand before an Austrian firing squad because of his loyalty to Italy. Among Italian geographers he showed exceeding zeal for detailed studies of the Trentino, and this life work of his has made it possible to bring together in such compact form the salient facts which validate the Italian claims to the region. The maps accompanying the text deserve particular attention both on account of the valuable data they embody and as an example of thoroughness in cartographic presentation.

A comparison of the maps shows that the population of the Trentino is almost exclusively Italian. Past the administrative boundary to the north, however, the Italian element is in the minority everywhere in the Alto Adige. These differences in the population appear to have been taken into account by the Italian government prior to Italy's entry into the war. Italy's unwillingness to include a large German element in its population is evident in the boundary rectification proposed by the Italian government to the Austrian government. The line suggested by Italian statesmen falls south of the line considered the natural boundary by Italian geographers. This geographical line, as shown on Pl. III, coincides with the Danube-Adriatic divide.

The configuration of the land with its lines of access from the north and south shows how easy it was for Teutonic penetration to make headway in the region. The fact was bewailed by Italian chroniclers of the sixteenth century. Plate XVII shows that the Trentino contains within its area a number of the important routes of travel and commerce which connected inland Europe to the southern seas of the continent. Hence Italians and Austrian Teutons have been brought face to face in our day.

The economic character of the region and an intimation of the lines along which future developments are likely to take place is admirably brought out in Plates VII to XV. The high standard set by the firm of De Agostini has been maintained in these maps, and workers engaged in regional studies will profit in making a close examination of the methods used in the treatment of the varied subjects. LEON DOMINIAN

HANN, JULIUS V. **Die Ergebnisse der meteorologischen Beobachtungen auf dem Sonnwendstein (September 1907 bis August 1908, Semmeringgebiet): Ein Beitrag zur Meteorologie der Berggipfel.** 83 pp.; ill. Reprinted from *Sitzungsber. Kaiserl. Akad. der Wiss. in Wien, Mathem.-Naturw. Klasse*, Part IIa, Vol. 125, 1916, No. 1-2.

Von Hann is so thoroughly a master of every phase of meteorology and climatology

that there is hardly any subject in either of these branches of science to which he has not made important contributions. One topic to which he has long devoted attention is mountain meteorology. It was in connection with his study of the Sonnblick records, about 1890, that he discovered the facts which led him to abandon the convectional theory regarding the origin of extratropical cyclones and to propose what has since then been known as the Hann, or eddy, theory.

Von Hann's latest contribution to mountain meteorology is his study of one year's observations on the Sonnwendstein (Sept., 1907-Aug., 1908), an observatory established in 1907 in order to provide a more favorable site for astronomical work than is available in Vienna. It is worth noting, in view of what has occurred since, that Professor George E. Hale and Dr. A. Schuster were among the first to urge the importance of such a station upon the Austrian government. The Sonnwendstein has the advantage of being near Vienna, being easily accessible, and having a good exposure. The elevation of the summit is about 5,000 ft. (1,523 m.). A first-class meteorological station was in operation, temporarily, from September 1, 1907, to August 31, 1908. It appears that only 70 per cent of the intensity of solar radiation which is measured on the Sonnwendstein reaches Vienna. In other words, the turbid atmosphere over the city absorbs 30 per cent.

R. DEC. WARD

ASTORI, BRUNO. Pola. Ills. *Riv. Mensile del Touring Club Italiano*, Vol. 22, 1916, No. 10, pp. 551-555.

BERTOLINI, G. L. L'orologio solare di Aquileia e la sistemazione della rosa dei venti nel medio evo. Diagr., ill. *Boll. Reale Soc. Geogr. Italiana*, Vol. 5, 1916, No. 12, pp. 969-985. Rome.

BLINK, H. Galicië en zijn bewoners. *Vragen van den Dag*, Vol. 31, 1916, No. 11, pp. 817-829.

CHOLNOKY, EUGEN DE. Klimatische Wirkung des grossen asiatischen Monsunsystems in Europa. Diagr. *Atti X Congr. Internaz. di Geogr., Roma, 1913*, pp. 814-822. Reale Società Geografica, Rome, 1915. [Effects in Hungary.]

CUMIN, GUSTAVO. La preistoria nella Venezia Giulia. *Archivio per l'Antropologia e la Etnologia*, Vol. 45, 1915, No. 3-4, pp. 219-240. Florence.

— Flotilla austrohúngara del Danubio, La, en la guerra con Rumania. Maps, diagr. *Rev. Gen. de Marina*, Vol. 81, 1917, No. 3, pp. 333-349. Madrid. [Describes the use of light-draft Austrian monitors in co-operation with land forces along the shifting channel of the central Danube. Austria has considered it necessary to keep up this flotilla in order to ensure free navigation to the Black Sea in times of peace as well as to assist her armies in case of war. Control of the river was an important factor in the success of the Teuton campaign against Rumania. "To the Dual Monarchy the Danube is an artery of life."]

FRESHFIELD, D. W. The southern frontiers of Austria. Map, ill., bibliogr. *Geogr. Journ.*, Vol. 46, 1915, No. 6, pp. 414-435 (discussion, pp. 433-435). Also in *Alpine Journ.*, No. 211, Vol. 30, 1916, pp. 1-24. [Noticed in the *Geogr. Review*, Vol. 4, 1917, p. 212.]

GERBA, RAIMUND. Die Grenze von Galizien. *Österreichische Monatsschr. für den Orient* (herausgegeben von K. K. Österreichischen Handelsmuseum in Wien), Vol. 41, 1915, No. 9-12, pp. 320-323.

GRIBAUDI, PIERO. Il porto di Trieste e la sua funzione economica. *Boll. Reale Soc. Geogr. Italiana*, Vol. 6, 1917, No. 2-3, pp. 128-156. No. 4-5, pp. 336-355. Rome.

HECKE, WILHELM. Die Ortsnamenschreibung in Österreich. *Petermanns Mitt.*, Vol. 62, 1916, Sept., pp. 327-328.

HRDLÍČKA, ALEŠ. Bohemia and the Czechs. Ills. *Natl. Geogr. Mag.*, Vol. 31, 1917, No. 2, pp. 163-187. [A strong and interesting paper by the well-known anthropologist. While chiefly historical and political, it contains valuable geographical data on population, immigration, and national character.]

JOVANOVIĆ, V. Illustrierter Führer durch Mödling und Umgebung. xi and 81 pp.; ill., bibliogr. J. Thomas Verlag, Mödling, [1916]. Kr. 1.20. 6 x 4½.

LÓCZY DE LÓCZ, LOUIS. La géomorphologie des environs du lac Balaton. Maps. *Atti X Congr. Internaz. di Geogr., Roma, 1913*, pp. 550-560. Reale Società Geografica, Rome, 1915.

MUSONI, F. Il M. Nero e la toponomastica della Venezia Giulia. Map. *Riv. Geogr. Italiana*, Vol. 23, 1916, No. 6-7, pp. 233-253.

PAWŁOWSKI, STANISŁAW. Résumé [sur la morphologie des Klippes des Piénines]. *Odbitka z czasopisma Polskiego Towarzystwa Przyrodników im. Kopernika*, Vol. 40, 1915, pp. 138-140. Lemberg.

PAWLOWSKI, STANISLAUS. *Über ein altes Talstück in der Bukowina*. Map. Reprint from *Mitt. der Geol. Gesell.*, Vol. 3, 1914, No. 4, pp. 246-255. Vienna.

PAWLOWSKI, STANISLAW. *Z geomorfologii wyspy Veglii*. Bibliogr. Reprinted from *Odbitka z czasopisma Polskiego Towarzystwa Przyrodników im. Kopernika*, Vol. 39, 1914, pp. 681-684. Lemberg. [Observations on the geomorphology of the island Veglia. "The valley of the river Fiumera near Bescanuova is occupied by a sedimentary series of Eocene age. According to the published descriptions of Stache and Waagen these rocks include sandstones with and without fossils and conglomerates. They form a part of a great synclinal fold, resting on limestones of Cretaceous age. The beds lie not flat, but are dipping from north to south. Erosion has removed the upper portion of the series. The remnants of the old level are terraces along the sides of the valley."]

SPITALER, R. *Der tägliche Gang der Windgeschwindigkeit, insbesondere der stürmischen Winde auf dem Donnersberge*. Diagr. *Meteorol. Zeitschr.*, Vol. 33, 1916, No. 8, pp. 337-351. [Bohemia.]

ASIA

TURKEY IN ASIA, ARABIA, CAUCASIA, IRAN

RAMSAY, W. M. *The intermixture of races in Asia Minor: Some of its causes and effects*. 64 pp. Reprinted from *Proc. British Academy*, Vol. 7. Humphrey Milford, Oxford University Press, London, [1917]. 3s. 6d. 9½ x 6.

An historical characteristic of the Ottoman population has been its utter lack of homogeneity. Professor Ramsay explains this condition as based on ancient shiftings of Asiatic peoples. Asia Minor is a bridge land, and a human residue from each passing wave has been deposited upon it. Since the decline of Ottoman power in Europe and the beginning of a persistent Turkish recession the Mohammedans of lost provinces have been induced to settle in Asia Minor. Russian Mohammedans seeking escape from Christian allegiance have added their quota to the population in modern times. Thus the influx of alien elements into the peninsula has been steadily maintained for the last seven hundred years.

Ramsay's account is enlightening because it shows what changes may take place in the population of a region through a slow infiltration of aliens maintained uninterruptedly. At the same time the persistence of a local type and its remarkable power of absorbing the foreign element is brought out. Thus the population of Asia Minor, notwithstanding the strongly marked cultural cleavage lines which it betrays, presents striking anthropological similarity.

A tendency appears in places to ignore the part played by geography, as when the destruction of the Byzantine social order is attributed to the introduction of nomadism in Asia Minor by the Turks. Here the author fails to note that the interior plateau is physically an ideal environment for the nomad. The Turk, fresh from Asiatic wanderings and having never thought of settling, naturally kept up his accustomed mode of life in Anatolia because nature invited him to it. Thus Anatolia became the cradle of the modern Turkish state. For the last two centuries it has been the main recruiting ground of Turkish armies. But its man power is now on the wane, and the danger of the transformation of the Turkish state into "a great military weapon of the same kind as it was in the beginning" may not appear as great as the author intimates. Turkey entered the war with an army exhausted by the Balkan Wars, and has since lost the bulk of its southern territory. Today the real Turkish danger lies outside of the Turkish boundary.

Perhaps the chief value of Professor Ramsay's work is to show the impossibility of unifying backward races assembled under the rule of a single state. Supervision by the better organized powers then seems to be a necessity.

LEON DOMINIAN

WATSON, C. M. *Fifty years' work in the Holy Land: A record and a summary, 1865-1915*. Palestine Exploration Fund. 190 pp.; map, ill., index. The Committee of the Palestine Exploration Fund, London, 1915.

This volume is an inventory of achievement which fittingly commemorates the fiftieth anniversary of the founding of the Palestine Exploration Fund. Glancing over the field of varied studies conducted by the members of this famous institution, one can hardly abstain from attributing, at the very outset, greater weight to its surveys than to any other branch of its work. History, geology, archeology, anthropology, and religion all received important contributions; and yet none of the results in these branches of study can claim the all round usefulness of the cartographic achievements. The most extensive surveys of Palestine so far recorded in map form are due to the labor of a number of well-known workers who gave their time to the Palestine Exploration Fund.

A few years after the foundation of the society in 1865 it became evident that no reliable work could be undertaken without an accurate base map. The only section of Palestine of which trustworthy maps then existed was the coast, which had been charted by the British Admiralty. The survey of western Palestine was undertaken first. Operations lasted from 1871 to 1877. The results of this important work appeared in 1880 in the shape of a one inch to the mile map, which may be considered as one of the most important scientific productions that has come out of the Holy Land. Through this map the historical value of many Biblical passages was determined. Needless to add that the map has also served as a base for investigations of a wide range and that it has been indispensable to travelers.

The success which attended the production of this important cartographic document led the Committee of the Palestine Exploration Fund to extend operations to eastern Palestine. In spite of considerable difficulties it succeeded in bringing out another valuable map of Palestine on the scale of $\frac{3}{8}$ of an inch to the mile. Today these maps, although somewhat antiquated as regards modern methods of reproduction, still remain reliable standards for this section of the world. Further work in southern Palestine undertaken in 1913-14 was cut short by the war.

A mass of material on the history and geography of the Holy Land has also been disseminated among students through the Fund's publication of a series entitled the "Palestine Pilgrims' Texts." The list of volumes published shows that Palestine has attracted Christian tourists since the early centuries of our era. As a contribution to the history of travel in ancient and medieval days this series takes a leading rank.

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CHINA

BASHFORD, J. W. **China: An interpretation.** 630 pp.; ill., bibliogr. index. The Abingdon Press, New York, Cincinnati, 1916. \$1.00. 9 x 6.

Bishop Bashford, who has traveled extensively during a twelve-year residence in China, has talked with many people and filled many notebooks in an "endeavor to interpret the Chinese to the Western world as we would like Chinese writers to interpret Americans and Europeans to the Orient." He has digested the matter in most of the available literature on the subject and arranged his treatise on social, economic, political, and intellectual China in twelve consecutive chapters which constitute perhaps the most convenient and accurate brief account of the country and its people to be found today in print. The remaining six chapters of the volume consist of discussions on the relations between China and other nations, in which the author, while carefully maintaining his attitude of benevolent neutrality, adds little of value to what has already been printed upon a highly controversial topic. It does not militate against the usefulness of his book to say that his authorities are all foreign; available data for an account of China are not to be found in works in the Chinese language, nor are natives there able to describe the physical or industrial factors in their own development without recourse to the books of foreign investigators. Bishop Bashford's brief bibliographical lists at the end of each chapter add measurably to the value of his book. Considerable use has been made of Werner's "Descriptive Sociology of the Chinese," the most expensive but perhaps the most satisfactory volume in Herbert Spencer's great series on descriptive sociology, a book seldom noticed by writers on China, but one without which no library on that country is complete.

F. W. WILLIAMS

HULLU, J. DE. **Over den Chinaschen handel der Oost-Indische Compagnie in de eerste dertig jaar van de 18e eeuw.** *Bijdragen tot de Taal-, Land- en Volkenkunde van Nederl.-Indië*, Vol. 73, 1917, No. 1, pp. 32-151. The Hague.

The rise of the Dutch East India Company is, of course, a matter of wide interest to the student of the colonization of the Far East and the history of the Dutch possessions. One of the more important side issues of this company was a trade with China. Direct commerce between the Netherlands and China being impossible owing to certain territorial treaties among such European nations as had an Oriental commerce in the seventeenth and eighteenth centuries, the Dutch East India Company was at first absolutely dependent upon Chinese vessels to carry tea and other exports from the Celestial Empire to Batavia, whence they were transhipped to company vessels and carried to Amsterdam. According to De Hullu, unwise laws and prohibitive restrictions, with accompanying heavy fines for transgressions, caused the Chinese merchants at one time to withdraw their vessels from routes leading to Dutch East India ports and as a consequence the Dutch East India Company became hard pressed to supply their warehouses in Amsterdam with the much-needed Chinese commodities. In addition to this, a rival company, the Ostend Company, financed by bankers in Vienna and Brussels, regardless of treaties and trade agreements, began to send vessels direct to China and were instrumental in cutting the Chinese profits of the Dutch East India Company to an almost fatal degree. How profitable the Chinese trade was, is explained by figures given by De Hullu, who describes at length a trading voyage of the *Coxhorn* from Amsterdam to Wampoo (Huampo), China. This vessel, with a cargo capacity of about 150 tons, arrived at a home port after an eighteen months' trip with a cargo on which the net profit amounted

to 324,471 guilders (about \$128,000). This, with a vessel unable to carry more than 150 tons of cargo, seems well-nigh incredible, especially so when one takes account of the greater purchasing power of a guilder in 1730 than in 1918. It is of interest to note the goods contained in the *Coxhorn's* cargo: 268,479 pounds of tea, 570 bolts of silk of all colors, 124,595 cups and saucers for tea, 17,040 cups and saucers for coffee, 9,457 cups and saucers for chocolate, 116 table services, etc. It was this profitable voyage which brought forth a storm of protest from the Directors of the India House in London, who claimed the Hollanders had violated the privileges of the English East India Company by direct trade with China.

One of the remedies tried by the Dutch East India Company to overcome the evil of a restricted trade with China was an attempt to make the planters in Java undertake tea culture. This attempt, however, was not successful, as the company, while agreeing to purchase all tea grown, did not agree to finance the planters in their undertaking. A careful perusal of De Hullu's paper will convince the reader that Pitt's doggerel

"In matters of commerce, the fault of the Dutch

"Is giving too little and asking too much"

would not be misapplied to the Dutch East India Company and that the greater part of the company's misfortunes in its China trade was caused directly by the unwise restrictions and greedy policy imposed by the Council of Seventeen in Amsterdam, who frequently were totally ignorant of the conditions with which their deputies in the colonies had to contend.

The investigator of Oriental trading methods in the eighteenth century can find important data in De Hullu's paper, and the description of the means by which Chinese customhouse officials had to be propitiated is instructive and amusing. Ceremonial visits paid by the captains of incoming vessels to the *hoppo* (chief customs officer), with the invariable tea drinking and the equally invariable monetary "gift" to the *hoppo*, are described in full. Dr. De Hullu is to be congratulated on having brought out a paper which covers the subject so completely.

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ALSACE-LORRAINE AND EUROPE

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[With separate map, Pl. VI, facing p. 112.]

On both sides of the ocean men of authority have proclaimed that the Alsace-Lorraine question was pre-eminently one of justice. It is also, on account of the geographical situation of the country, a matter of general concern to all Europe and, consequently, to the rest of the world in so far as it affects the world's peace.

Such are the conclusions that are drawn in a book that has recently appeared, a book full of facts and of ideas relative to present events.¹ The author, the late Professor Paul Vidal de la Blache, was one of the master geographers of our times. He had always devoted himself to tracing the influence of nature on political and economic history. This philosophy of geography finds a new field in his book. Not one of its pages but "reveals the circumstances under which it was written. How indeed could it be otherwise? Yet I assure you this is not an 'opportunist' volume." Were it necessary to substantiate this statement with which Professor Vidal de la Blache prefaces his work it can be pointed out that he has already treated of several of the theories he expounds in his "La France: Tableau Géographique."²

The following pages have been largely inspired by his "France de l'Est," and the writer has borrowed freely from it.

The Land

Alsace-Lorraine is the name the Germans have given to the territory wrested from France in 1871. This territory included all of Alsace and a third of Lorraine.

¹ Paul Vidal de la Blache: *La France de l'Est (Lorraine-Alsace)*, Colin, Paris, 1917. Abstracted in the *April Review* (Vol. 5, 1918, pp. 328-329).

² Hachette & Cie., Paris, 1908; also, without illustrations, as the first volume of Lavisse's "Histoire de France," 1903.



FIG. 1.—The Marne-Rhine Canal, built by the French Government and completed in 1854, at Lützelburg, its highest point in the crossing of the Vosges.

PHYSICAL CONFIGURATION OF ALSACE

Alsace and Lorraine, however, are in reality two distinct countries. Alsace is a part of the long plain through which the middle Rhine flows between Basel and Mayence,* but within this unit it occupies a separate position, the size of the stream and the swiftness of its current up to the very outskirts of Strasburg being a barrier between the two sections of the plain. Although Lake Constance serves to regulate the flow of the Rhine, the Aar River, which reaches it below the lake with the waters from a large part of the Swiss Alps, tends to keep its regimen torrential. Its gradient is steep as far as its confluence with the Ill (1 in 1,000). From this point to Mayence it is only 0.25 in 1,000.

Before its waters had been confined by dikes or levees the river often overflowed its banks, and the sediment deposited by these floods long ago still covers the land along its banks. Only forests will grow on this meager, sandy soil. No towns in Alsace were built on the river's banks. Strasburg, which reaches to the Rhine nowadays, was originally built on both sides of the Ill. Alsace and Baden's only means of communication up to the middle of the nineteenth century, when the railroads came into existence, were pontoon bridges. These were withdrawn in time of flood.

Northward the Alsatian plain continues as that of the Palatinate. Its limits are indefinite, being set by some at the Lauter River, by others at the Queich, the stream on which lies Landau. There are great forests there which cover almost the entire country.

The Vosges in the background were also an obstacle for a long time, at least the really mountainous portions, from the high domes of the Ballons in the south to the Donon in the north. The range is not an elevated one (its highest peak, the Ballon de Guebwiller, is not more than 4,667 feet), but its sides are covered with splendid forests of beech and spruce even at the present time. Only the peaks over 3,900 feet high rise above the timber line, which, for an isolated range, is an exceptionally low one.

PHYSICAL CONFIGURATION OF LORRAINE

Lorraine has much more variety. Geologically a part of the great Paris Basin, it is composed of concentric zones which form a series of steps from the Vosges to Champagne. Each one has a different aspect. First there are the limestone and marl plains, on which are spread the sandy deposits brought down by the streams from the mountains. Then rises sharply the escarpment of the Côtes de Moselle, a flange, as it were, to the limestone plateau which overlooks the Moselle between Metz and Diedenhofen (Thionville) and gradually recedes from it northward and then swings west. A wide forest belt covers this meager, calcareous soil up to its junction with the

* On the accompanying map (Pl. VI) place names are spelled according to the dominant language of a given region. In the text the form commonly used in English is employed for such places as Strasburg, Cologne, Treves, etc. Towns in the German-speaking section of Alsace and Lorraine are given in the German form, with the French equivalent added in parentheses when they are first mentioned.—EDIT. NOTE.

humid marl soil of the Woëvre. Back of this rises another limestone ridge, the Côtes de Meuse, also crowned with woods, running parallel to the Meuse, which the fortress of Verdun guards. These uplands of little relief continue toward the west until they reach a third salient line, the Forest of Argonne, which separates Lorraine from Champagne and is continued southward by low and wooded plains.

But Lorraine, although lying in the Paris Basin, is also a separate district. Her two great rivers, the Moselle and the Meuse, instead of flowing toward Paris turn to the Rhine. Only the waters of the Barrois district, of which Bar-le-Duc was the capital, join the Marne and flow toward Paris.

These two countries, which turn their backs on each other, thus had no common ground from which a political group could evolve. It is a remarkable fact that the Alsatian plain has never furnished the framework for a feudal state. In the tenth century it was attached to Swabia, beyond the Rhine, but this union, which did not take the natural obstacles into consideration, could not endure. They were in any case an ill-assorted pair, for the Alsatian has an age-old antipathy to the Swabian, whom he calls "Schwob," including in the term all his neighbors to the east.

As to Lorraine, in spite of the efforts of her dukes, she never included all of the country we now know by that name. Even though they managed to obtain Barrois by inheritance in the fifteenth century, the bishoprics of Metz, Toul, and Verdun always escaped their covetousness.

COMMUNICATIONS

This "infirmity of structure" has proved a heavy burden upon the destinies of the two provinces; they have found themselves argued and fought over, torn between east and west, between Germany and France.

Alsace and Lorraine, however, communicated easily enough with each other in the north by means of the Zabern gap (Col de Saverne), which was always one of the great highways of travel between the Marne and the Rhine. This far northward the Vosges can no longer be called mountains, and the forest itself is only a fringe a few miles wide.

From Pfalzburg (Phalsbourg) on the Lorraine upland at an altitude of 1,102 feet there is a gradual ascent to 1,351 feet, then a descent of 596 feet to Zabern in the Alsatian plain. This is the route taken today by the highway, the railroad, and the canal which joins the Marne to the Rhine.

But Lorraine is in easier communication with the countries to the west and south. There is a natural passage between the Moselle at Toul and the Meuse at Commercy which evades the obstacle of the Côtes de Meuse. It is, as Professor Davis has shown,³ an ancient stream bed through which the Moselle formerly ran to the Meuse. Toul owes its importance to this passage, from which highway, railroad, and canal draw equal advantage.

³ W. M. Davis: *La Seine, La Meuse et La Moselle*, *Ann. de Géogr.*, Vol. 5, 1895, pp. 25-49 (also in English in *Natl. Geogr. Mag.*, Vol. 7, 1896, pp. 189-202, 228-238; and in W. M. Davis: *Geographical Essays*, Boston, 1909, pp. 587-616).

Nancy later grew up on this same line of communication, the transverse axis of Lorraine.

Southward Lorraine communicates still more freely with Burgundy, by the upper valley of the Saône. Between the Vosges and the Plateau of Langres, a southern extension of the Côtes de Moselle, the way is wide open. There is a gentle descent from the plateau where the Meuse rises to the basin where meet the headwaters of the Saône. The Saône empties into the Rhone, which in turn flows into the Mediterranean. As early as Roman times a plan was formed to dig a canal uniting the Saône with the Moselle, a project which was not executed till the nineteenth century. The divide, west of Épinal, is only 1,198 feet in elevation.

ENTRANCE OF ROMAN CIVILIZATION

By this great opening the Roman road which starts at Lyons easily reached the Rhine by way of Toul, Metz, and Treves. One of its branches diverged toward Rheims and continued toward Boulogne, the port of embarkation for Britain. Another branched off in the plains of the Saône and, following the Doubs valley, entered Alsace by Belfort between the southern margin of the Vosges and the first foothills of the Jura. At this point the Rhine plain merges with that of the Saône, Alsace with Burgundy. Nowhere in western Europe is communication more easy between the region whose waters flow to the Mediterranean and that which sends its waters toward the North Sea. The city of Basel is on the Rhine at the end of this natural passageway.

The Roman roads were to the first centuries of our era what the railroads are in our times. Along these roads traveled not only men and merchandise but also ideas. They were the arteries by which Latin civilization penetrated to the Rhine. Rome was more in evidence here where her legions were encamped along the Rhine face to face with the barbarians than she was in other parts of Gaul. Numerous relics show that Alsace and Lorraine were thoroughly imbued with her civilization. The Latin tongue replaced their ancient idioms.

THE GERMANIC INVASION

But in the fourth century the barrier gave way and the tide of Germanic peoples overflowed into Gaul. It is probable that the invaders remained in greater numbers in the countries contiguous to their ancient frontier, since the Germanic idioms there superseded the Roman tongue. The city of Metz, however, which had become strongly Latinized, proved impermeable to the new vernacular. Even to the present day the linguistic boundary makes a wide sweep around the city from Diedenhofen on the Moselle downstream towards the Donon, the last high peak of the Vosges. Even in a number of the Vosges valleys on the Alsatian side French is still the current language. Doubtless the invaders scarcely penetrated into this

forested region.⁴ Four centuries later Charlemagne essayed to reconstruct the Roman Empire. He marched from Gaul to overcome the countries beyond the Rhine. His ephemeral empire resulted at least in carrying Christianity to the farthest confines of the Slavic world and in binding Germany to Rome by this spiritual link.

ORIGIN AND SIGNIFICANCE OF LORRAINE

How soon this empire was disrupted is known. In 843, at Verdun, the grandsons of Charlemagne divided their heritage into three parts, the East Frankish Kingdom, which has become Germany, the West Frankish Kingdom, which has become France, and between the two a long stretch of territory which extended from Rome to the mouths of the Rhine, a curious state which comprised the most varied populations and had no possibility of enduring. No better name was found for it than that of the prince to whose lot it fell: the Kingdom of Lothaire, Lotharii Regnum, from which comes the name of Lorraine. The application of this name became more and more limited as the territory to which it was first given dwindled, until at last it indicated only the little Duchy of Lorraine. If a more logical partition had been made, especially one more in accordance with geographical conditions, the course of history for centuries would doubtless have been different. The two neighboring kingdoms ceaselessly disputed with each other the possession of parts of this Kingdom of Lothaire. Flanders, Alsace, and Lorraine have become fields of battle where France and Germany contended, or more accurately, where met the principles represented on the one hand by Central and on the other by Western Europe.

ALSACE AS A CROSSROAD

When the countries beyond the Rhine had definitely evolved from primitive barbarism new routes were opened to commerce. These always followed the pathways predetermined by nature, and Alsace became the crossroads. Through Basel she could easily communicate with the Danube and the great Alpine passes; by Mayence and Frankfort, with Hesse and Thuringia, which in turn connect with North Germany. The Rhine played its part as a navigable waterway.

THE POSITION OF STRASBURG

Alsace and Lorraine thus became transit lands. Strasburg particularly profited by all this commerce. The "City of Roads," as its name indicates, occupies a remarkable position. It is situated at the outlet of the Zabern gap route; it lies near the Rhine, where the river, here more tranquil, begins to become navigable; it is built on both banks of the Ill, the pre-eminently Alsatian river, which follows the plain for three-quarters of its

⁴ See Leon Dominian: *The Frontiers of Language and Nationality in Europe*, American Geographical Society, New York, 1917, Pl. II.

length and receives the greater part of the waters flowing from the eastern slope of the Vosges. Strasburg thus became in the Middle Ages a sort of merchant republic.

THE POSITION OF METZ

The position of Metz is no less favorable to commerce. Located on the Moselle, which here divides into several branches and consequently is more readily crossed, it is in easy communication with the plateaus of the left bank through the ravines which cut into the Côtes de Moselle. Eastward no obstacles separate it from the gently rolling upland which extends to the Zabern gap. The shortest road from Paris to Strasburg is by way of Rheims, Verdun, and Metz. This is the route today of a railroad, the alternative to that which passes through Bar-le-Duc, Toul, and Nancy. Even the little Meuse cities of Neufchateau and Verdun achieved an importance by this commerce which they have since lost.

FERTILITY OF THE COUNTRY

This commerce also drew its sustenance from within the country itself. Although the Rhine and the streams descending from the Vosges have in some places left unfertile gravelly deposits on the Alsatian plain, everywhere else thick beds of loam, of that loess whose name is nowadays given to all similar soils, lend themselves admirably to the cultivation of cereals. Sheltered by the ramparts of the Vosges, a continuous zone of splendid vineyards occupies the foothills. The marly upland of Lorraine also grows large crops; more fertile still are its deeply entrenched valleys. On the alluvial soil of the Moselle valley, near Metz, flourish bountiful vegetable gardens, and on the valley sides are vineyards and orchards bearing delicious fruit. "These Alsatian and Moselle regions have what the sterile schist and sandstone terranes which surround them lack; they abound in what is wanting in those foggy plains which end in the northern seas. In comparison with these they seem like favored lands, lit by more brilliant skies, rejoicing in sunnier autumns, in a more smiling aspect of nature. Alsace's tobacco was principally marketed in Germany; her grains fed part of Switzerland; her wines were bought 'by Frisians and Morini,' wrote a chronicler of the eleventh century; those of Lorraine and Barrois found purchasers in the Electorate of Liège. The Rhine transported to the Low Countries timber from the mountains and brought back in exchange merchandise from beyond the seas."⁵

EASE OF COMMUNICATION WITH PARIS

But all these ways that diverged to the north, south, and east, converged on the other hand in the west, in the Paris Basin, following the slope of the land, and the entire system was connected at Paris with the highways from Flanders. The railroads and canals today follow the same natural

⁵ Vidal de la Blache, work cited in footnote 1, p. 16.



FIG. 2—Strasbourg: The old part of the town dominated by the spire of its Cathedral. In the foreground two arms of the Ill.

routes. "The great open region giving access to the sea by way of Rheims or Paris is the most direct way by which Mülhausen (Mulhouse) can supply its factories and Lorraine ship its iron, and it is by this route that those bonds which bind men in a common understanding have slowly been forged, more by the interchange of ideas than of merchandise."⁶

Union with France

The various parts of the region under consideration became in succession united with France: part of Barrois in the fourteenth century; the three bishoprics of Metz, Toul, and Verdun in the sixteenth; and what remained of Lorraine in the eighteenth. With the other French provinces which had either peacefully or by right of conquest come under French dominion they gathered in turn about the capital, as though by some natural attraction. The parts dispersed during feudal times seemed destined once more to be united; ancient Gaul tended to reconstruct her former boundaries.

Without entering into minute historical details it is nevertheless fitting to show with what facility these successive annexations were accomplished and how little rancor or regret they left in the minds of those concerned.

METZ AND ITS FRENCH CHARACTER

The city of Metz was a sort of independent republic, as was Strasburg. Although nominally a part of the German Empire it did not pay tribute, and it had always refused to permit the decisions of its courts to be reviewed by an Imperial tribunal. Occasionally the burghers of Metz, disturbed by the ambitions of their neighbors, the Dukes of Lorraine on the one hand and the Kings of France on the other, reminded the Emperor that he was their protector, but when that same Emperor attempted any curtailment of their liberties, they resolutely placed themselves under the aegis of the King of France. Identity of speech made relations with France exceedingly easy. It has been noted that Metz was always a French-speaking city. Indeed the oldest official records in the French language known to be in existence came from this ancient town. All her chroniclers wrote in French. Her magistrates, whenever they came into official relations with Germany, had to have recourse to translators.

HOW METZ CAME TO BELONG TO FRANCE

After the Protestant princes of Germany had been defeated in 1547 by the Emperor Charles V in their revolt against his religious authority they implored the assistance of the King of France, Henry II. In return for his help he was to be allowed to occupy the French-speaking cities of the Empire, Cambrai, Toul, Verdun, and Metz, and was to retain possession of them as a "Vicar of the Holy Empire." This was done. On April 15,

⁶ Vidal de la Blache, work cited in footnote 1, p. 17.

1552, the King of France entered Toul, without protest from the inhabitants; a few days later, on April 18, he took Metz by surprise. The burghers, espousing the cause of the Protestant princes, took the oath of fealty to him on April 21, reserving only "the rights of Empire."

The blow was a severe one to Charles V. From October to December, 1552, he besieged the city, but in vain, and was finally obliged to return to Germany with the remnants of his army. Thus Metz became French with the consent and, one may say, with the co-operation of its inhabitants, who have always been very proud of this memorable siege. It was commemorated by an inscription carved on one of the principal gates of the town. The Germans obliterated this after they came into possession in 1871. By June, 1553, the King of France had also taken possession of Verdun. In 1684 the German Empire by the Treaty of Westphalia surrendered all claim to these three bishoprics.

HOW ALSACE BECAME FRENCH

In the course of the religious wars which the Treaty of Westphalia brought to a close, Alsace also had come under French sovereignty. Both parties had called upon other nations for assistance, the Protestants addressing themselves to Denmark, to Sweden, and finally to France. Alsace was at that time only a heterogeneous assemblage of small states. Ten of the cities had formed a league called the Decapolis. Strasburg was not in this; nor was Mülhausen, which was allied to the Swiss Cantons. These small Alsatian states were also divided between Protestantism and Catholicism, and naturally the Protestants united with France. The Swedes, however, had so ravaged the country—recollections of this time still persist among the peasantry of Alsace and Lorraine—that the Catholics themselves had begged the aid of France, and had surrendered to her Zabern and Hagenau. As a consequence of all these various arrangements, Alsace was "placed in trust" in France's hands as the price of her intervention. After the treaty of peace was signed in 1648 she remained French, all but the city of Strasburg.⁷

STRASBURG

Whether or not France had the right to occupy Strasburg in 1681, under the clauses of the Treaty of Münster, is a matter of dispute; both sides can be upheld. The old diplomacy excelled at introducing intentionally obscure articles into a treaty, leaving an open door for all manner of future evasion. Louis XIV profited by equivocal phrasing, to be sure, but it must be conceded that it would have been difficult for Strasburg not to have cast in her lot with the rest of Alsace sooner or later. The Treaty of Ryswick in 1697 acknowledged the *fait accompli*.

⁷ And Mülhausen, which remained independent until 1798 and then joined France of her own free will.

HOW LORRAINE BECAME FRENCH

The Duchy of Lorraine became French, at least in anticipation, by an arrangement concluded in 1737. Her situation was a singular one. Hemmed in between France and Alsace, cut in two by a great highway belonging to France which connected Zabern and the three bishoprics, it had only a shadow of its former independence. The last duke, Francis III, was at that time suing for the hand of Maria Theresa, daughter of the Emperor Charles VI, in the hopes of inheriting from him the Imperial



FIG. 3—An arm of the Moselle in the inner part of Metz. The Cathedral on the left.

crown. He understood that France would not tolerate so dangerous a neighbor⁸ and voluntarily exchanged the country of his fathers for the Duchy of Tuscany. The duchy was given to the dethroned King of Poland, Stanislas Leszczynski, father-in-law of Louis XV, on the condition that it should revert to France after his death. Stanislas' reign was in reality a period of transition. Lorraine, which had been governed since 1737 by French administrators, was scarcely aware of any change of rule when she became incorporated into the Kingdom of France in 1766.

THE CASE OF ALSACE

It is not surprising that French-speaking countries such as the three bishoprics and the greater part of Lorraine should easily have become

⁸ The Duchy of Lorraine had been declared independent in the Treaty of Nuremberg in 1542. Its duke had then ceased to be a German vassal and become a sovereign. If Francis III had kept Lorraine in becoming Emperor, it would have become once more a German dependency.

united to France. Their previous connection with Germany had been the result of treaties which were concluded without taking racial affinities into account. But the Alsatians, on the other hand, spoke a German dialect, and it is really remarkable that they should have joined her so quickly.

It has often been said that Alsace did not become really French until the time of the Revolution. Impartial testimony, however, shows that the understanding between France and her new conquest was developed gradually in an atmosphere of reciprocal good will. First and foremost Alsace was assured of the peace which she so greatly needed after the terrible ravages of the Thirty Years War. She felt herself protected; and, until the conclusion of the wars of the Empire, the distress and anguish of being invaded were hers no more. She was above all most intelligently, even admirably, governed. The French *intendants* who were sent to her came without any pre-determined policies, anxious only to assure, together with the authority of the King, the welfare of the people confided to them. The cities maintained their old municipal institutions. The numerous German princes who owned lands in Alsace continued to collect taxes and to dispense justice in their own names. They were only required to acknowledge the sovereignty of France. Alsace, as well as the three bishoprics and later Lorraine, even remained outside the French customs area and could thus continue to carry on freely the transit commerce which enriched her. This provision was in force until 1789, when the manufacturers and merchants of Alsace and Lorraine, who were beginning to feel the disadvantages of this law, complained that they were cut off from commerce with the great French markets and asked for its abolition.

THE GERMAN LANGUAGE

It may seem strange that France did not for a long time make any serious effort to discourage the use of the German language. The few measures that were taken to assure the recording of the laws in French were not strictly complied with, and French schools were not opened until the eighteenth century. In those days, however, the artless idea that language in itself is the symbol and proof of national spirit did not exist, though in ours it has become a weapon of war. The French Government cared very little whether or not the Alsatians used a German dialect, provided they remained faithful subjects of the French King. Rather than force them to an abrupt change of their habits and customs, it prudently left time to take its course. Alsace and Lorraine have since known other methods!

A HIGH COURT OF JUSTICE

There was only one important innovation, one which made a profound impression on the people. This was the institution of a sovereign court of justice, which was to be a court of appeal for all the small local jurisdic-

tions. French justice became synonymous with equal justice for all. The old democratic ideals of the Alsatian peasant were thus realized, and his confidence was gained in anticipation of the time when his heart would be won as well.

GRADUAL FUSION

“Thus fusion between two peoples predestined to mutual comprehension took place gradually without constraint or force and was all the more complete since it was accomplished by natural means. Gentle and continuous pressure welded together the various parts of the body politic. While little by little apparently divergent interests converged, a common ideal of civilization was also uniting the people in spirit. They learned to think and to feel alike, if not to speak alike.”⁹

THE PART PLAYED BY THE REVOLUTION

The French Revolution completed the union of elements. The breath of liberty carried away all special privileges and leveled all barriers. The injustice of laying taxes on the peasant to support alien princes who did not even reside in the country was done away with. Truly democratic regulations took the place of a whole network of petty laws which had discouraged all initiative. The number of small landowners was increased by the distribution of communal properties and the sale of lands belonging to the Church, which had been accumulating inordinately for centuries. Free exchange of goods with the French markets gave an impetus to manufacturing. Organized like the neighboring French *départements*, represented as they were in the national assemblies, and by men who often played a leading rôle there, Alsace and Lorraine came to have a full consciousness of being part of a great nation. The French language made more progress in a few years than it had in the previous century.

One of the most significant chapters of Professor Vidal de la Blache's book is entitled “The Revolution and the Spirit of the Frontier.” The very closeness of the connection with France threw into relief the differences that existed between Alsace-Lorraine and the outer world. Under the old régime the commercial relations of the two provinces had kept them in a sort of marginal existence. Their people had become accustomed to living in somewhat loose contact with the rest of the Kingdom. In ordinary affairs of trade and in the matter of language the relations were with Switzerland or the Palatinate, with Frankfort or Basel. In the noble families it was quite a common thing to go from the service of France to that of the Empire and *vice versa*. This was all changed as soon as intercourse with France was no longer confined to the aristocracy or to the merchants and the great masses of the people came to know and appreciate each other.

⁹ Vidal de la Blache, *op. cit.*, p. 60.

The boundary, which had been a mere line of demarcation, suddenly became a barrier. The results of that type of civilization which distinguished France from the rest of the world became apparent in a flash. The frontier had become a spiritual frontier.¹⁰

THE DEMOCRACY AND PATRIOTISM OF THE PEOPLE

The contrast between the new régime and that to which Germany was still passively submitting grew more obvious every day. The greater part of the Alsatians and Lorrainers who distinguished themselves in the army and reached high rank were from the middle class and even from the populace. Lefebvre was the son of a miller of Rufach; Ney, the son of a cooper of Saarlouis (Sarrelouis). What a lesson in democracy was taught by these careers! It must not be assumed, however, that these eastern peoples joined light-heartedly in all the Imperial adventures. The volunteers went enthusiastically to war in 1791 in defense of liberty; but after the Treaty of Lunéville in 1802, when victory was assured, the general desire was for the peace which was so greatly needed. In regard to these sentiments, Ehrenfried Stöber, a citizen of Strasburg who wrote in 1814, has left an eloquent testimonial. "Our conscripts," he said in speaking of the wars of the Empire, "left their homes with less eagerness than the Badenese, who started for Spain or for Russia at a sign from Bonaparte. But we are proud of our zeal in the Revolutionary wars. Yes, we fought valiantly then with our fellow-citizens, Frenchmen from all the provinces." This same Stöber, who was a writer of German verse, was anxious that there should be no doubt as to his patriotism. "My lyre is German," he wrote, "it resounds with German songs, but my sword is loyally French and loves the Cock of Gaul"—

*Meine Leier ist deutsch; sie klingt von deutschen Gesängen.
Liebend den gallischen Hahn, treu ist französisch mein Schwert.*

The inhabitants of this eastern part of France were hard-working people, firm in their democratic convictions, pacific but intensely patriotic, independent in spirit but with respect for law and order, seemingly unemotional—particularly in Lorraine—but capable of the utmost devotion to great causes and noble tasks. In Alsace the use of French became general in the educated classes. French was the language in which the historian Fustel de Coulanges and the great Pasteur taught at the University of Strasburg. The two principal newspapers which expressed and guided public opinion were *L'Industriel Alsacien* in Mülhausen and *Le Courrier du Bas Rhin* in Strasburg. The first was published entirely in French, the second was bilingual. In the villages all the old soldiers spoke French. The language also came little by little into more common use in the schools, although the government continued a policy of non-interference (which was perhaps carried too far) out of regard to the wishes of

¹⁰ Vidal de la Blache, pp. 79-80.

the clergy, both Catholic and Protestant, who looked upon innovations unfavorably.

CESSION TO GERMANY IN 1871

Thus the two provinces were living in peace and happiness when the war of 1870 broke out. It was with stupefaction that they heard, as soon as the preliminaries of peace became known, that their cession to Germany was under consideration. The Government for National Defense had been improvised after the fall of the Empire, but not regularly instituted, so that it was necessary in order to conclude a valid treaty of peace to elect a National Assembly, which met at Bordeaux. Although their country was in the hands of the enemy, Alsace and Lorraine unanimously elected deputies who favored carrying on the war. Heading the lists was the name of Gambetta, the personification of resistance. Is it necessary to recall the solemn and touching protest which the two sacrificed provinces made? Without a word of complaint, with thanks to those who had defended them, they voiced their infinite sorrow and their unshaken hope and proclaimed in the most emphatic and most sublime words the world has ever heard the inalienable right of peoples to dispose of themselves.

PROTEST AND EXILE

Three years later, in 1874, the annexed provinces were allowed for the first time to send deputies to the German Reichstag. Fifteen were elected. These men unanimously protested against Germany's abuse of power and in the presence of her representatives proclaimed their attachment to France.

The provisions of the treaty allowed the people of the provinces to retain their French citizenship providing they left the country before October 1, 1872, and a sorrowful exodus of those who could not endure to submit to German domination began. This continued long after the official date and in fact has never wholly ceased. The number of these exiles can only be estimated, for Germany has never made the figures public. It can not be far from 500,000, or more than a quarter of the present population, which in 1910 was 1,874,014.

Such are the facts against which Germany's persistent but unproven assertions cannot prevail. A few courageous voices have been raised even in Germany in defense of the truth. Bebel, who had never ceased to protest against the great wrong that had been done, said as late as 1907 in the Socialist Congress at Stuttgart: "Alsace and Lorraine revolted against the idea of separation from France because they had participated in her development for centuries, because they had benefited by the victories of the great Revolution, because, from a cultural point of view, they were closely identified with the spirit and traditions and soul of France." We have nothing to add to this declaration.

Rise of the Industries of Alsace and Lorraine

MODEST BEGINNINGS

For a long time the two provinces, Alsace and Lorraine, remained purely agricultural. They had a few industries, but these were of minor importance. The oldest was salt mining. The salt is found in the subsoil of the Lorraine upland plain, in a comparatively narrow belt about thirty miles long which extends on both sides of the frontier from the neighborhood of Nancy to Saaralben (Sarralbe; see map, Pl. VI). Before the beginning of the nineteenth century, it was obtained by evaporating the waters that were drawn from the rich salt stratum below. It was not until a later date that borings were made and the methods improved, particularly after several soda factories were installed in the vicinity. Several small foundries and later some glass factories sprang up here and there, particularly on the Lorraine slope of the Vosges mountains, whose forests were used for fuel. For a long time iron had been obtained from the ores which crop out on the sides of the Côtes de Moselle. In the eighteenth century all these industries still bore the traces of their modest origin.

THE TEXTILE INDUSTRY

The textile industry which has developed to such an extent on both sides of the Vosges owes its rise to Mülhausen. In 1746, in imitation of the factories at Basel, a plant was started for the manufacture of what was known in those days as painted linen, that is, material on which designs were printed. It was soon found necessary, in order to supply this industry, to install spinning and weaving machinery. Labor was cheap in the Vosges valleys, and linen cloth had been woven there for a long time. In the latter part of the eighteenth century, the making of cotton cloth was also introduced. It was in this manner that the textile industry gradually spread through all the Vosges valleys that opened towards Alsace, later invading those on the Lorraine side. The simple weaving done in the home by members of the family was superseded by factories which utilized the natural water power of the mountain streams. These were built progressively farther up the valleys as the result of the increasing improvement in the use of water power brought about by the invention of the turbine. A movement in the opposite direction has taken place since, and nowadays the factories are built on the plain because of better transportation facilities. The manufacturers of Mülhausen have excelled in intelligence, initiative, and energy. The first steam engine in Alsace was used in Mülhausen in 1812. The first railroad was opened in 1839 between Mülhausen and Thann. The manufacturers were profoundly cognizant of the social solidarity that modern industrial organization has created between employer and employee, and of the duties of the employer to those under him. This is another bond between France and Alsace.



FIG. 4.



FIG. 5.

FIG. 4—The Moselle valley just above Metz. In the background the Cotes de Moselle, surmounted by forts.
 FIG. 5—A small industrial town on the Alsatian slope of the Vosges: Ste. Marie-aux-Mines (Markirch).

THE NEW IMPETUS IN THE NINETEENTH CENTURY

Until the middle of the nineteenth century, in spite of the progress which had been made, industries only held a subordinate position in the two eastern provinces. No city in 1846 had 100,000 inhabitants. Only five had more than 20,000. These were Colmar (20,050), Mülhausen (29,415) and Strasburg (71,992) in Alsace; and, in Lorraine, Naney (47,765) and Metz (55,112). At this time the construction of through railroad lines and of the Marne-Rhine Canal (1854) and the Coal Canal (1866) gave a new impetus to manufacturing. Coal began to be used instead of wood in the foundries, and coal mining was begun in Lorraine south of Saarbrücken (Sarrebriek). Machine and textile industries increased, and as a result the country population was attracted to the cities; Mülhausen nearly doubled the number of its inhabitants between 1846 and 1866 (58,773 in 1866).

EFFECTS OF THE TREATY OF 1871

The treaty of 1871 surprised Alsace and Lorraine in the midst of this period of industrial development. The economic unity of the country was shattered. The annexed region was deprived of its outlet in the French market, and the part that was left to France did not seem capable of maintaining unaided industries of its own similar to those by which it had prospered. How were the textile mills of the Lorraine slope of the Vosges to exist without the thread spun in Alsace on which they had depended? As for the metallurgical industries they were almost all in the hands of Germany. Yet the two provinces managed to survive this crisis. In order to keep their position in the French market and thus continue in commercial relations with France, most of the organizations in Alsace and Lorraine duplicated themselves in French territory. Some of the factories located near Belfort and in the Vosges. The foundries likewise erected branches on French territory or else moved over bodily. Those of Moyeuve in the valley of the Orne extended over the frontier as far as Joëuf; those of Ars-sur-Moselle, near Metz, were rebuilt at Pompey, near Naney, at the confluence of the Meurthe and Moselle. Thus, of the two parts of the region, that which heretofore had the lesser industrial life was stimulated. The Vosges particularly profited by the new blood that had been introduced into the country. Belfort nearly doubled its population between 1872 and 1876, Épinal and St. Dié also grew, but a little more slowly, for the cotton mills established themselves by preference in villages or small towns as they had done in Alsace, which was an additional point of similarity between the eastern and western slopes of the mountains. In spite of opposition on the part of the German government, there was established and maintained across the frontier an interchange of enterprise, of capital, and of men.¹¹

¹¹ From 1888 to 1891 a passport, which had to be viséed by the German Embassy in Paris, was required for entry into Alsace from France. The Embassy had full power to issue or to refuse the pass.

MINERALS AND METALLURGY

It took some time, however, for the country to regain its equilibrium, and its marvelous industrial development did not begin until somewhat later. When it did come it was, as elsewhere, the result of the great strides that had been made in the science of metallurgy.

About 1880 an extension of the Lorraine iron ore deposits was discovered on French territory under the plateau of Briey. Like most of the Lorraine ores, they contained a trace of phosphorus, which made them almost useless for the manufacture of steel. But the discovery made by Gilchrist Thomas in 1878 of a method for dephosphorizing the molten metal obviated this earlier difficulty, and huge works with the most modern equipment sprang up in Lorraine on both sides of the frontier. Between the blast furnaces and the mine shafts ran a network of railways and overhead cables. Lost in the midst of all these activities the little villages began to look like relics of the past. Nearby, in the mill towns, a heterogeneous population assembled, Italians, Flemings, and Poles, for the country alone could never have provided enough labor to supply the demand. In the *arrondissement* of Briey, before the war, the foreign element had become more numerous than the native born.

The exploitation of petroleum on a commercial scale was begun in Pechelbronn, Lower Alsace. In 1904 in drilling in the forest of Nommenbruch, west of Mülhausen, deposits of potash were discovered which are far superior to those of Stassfurt in Saxony. Immediately steps were taken to make this wealth available. Eighteen pits were in operation or being sunk when the war broke out.¹² Modern industry on a large scale was now finally in possession of Alsace and Lorraine.

GROWTH OF THE CITIES

One of the principal results of this transformation was to hasten the exodus of the country population to the cities.

Strasburg had, in 1910, 178,891 inhabitants. It owes its importance less to its rôle of capital city of Alsace-Lorraine than to the development of its commerce and industries. Even though the ancient city, huddled about the old Cathedral with its soaring spire, still preserves its narrow streets and its high gabled houses and its atmosphere of long ago, new sections have sprung up all about it.

The foremost source of growth was the creation of a great port of commerce out of the nearby swampy land adjoining the river. It already disputes with Mannheim the title of being the head of navigation on the Rhine.¹³ This achievement was due to the obstinate perseverance of the Chamber of Commerce, in which old Alsatians predominated. Strasburg

¹² This discovery is of particular interest to the United States, which is Germany's most important market for the sale of potash as a fertilizer.

¹³ The tonnage passing through the port, which in 1872 amounted to 270,000, rose from nearly 1,000,000 in 1909 to 2,700,000 in 1914.

thus tends to regain her old place as a transfer point, to which she was destined by her geographical position, despite the determined resistance of the state of Baden, on whose territory Mannheim is situated, and the ill will of the Empire, which was not disposed to allow the interests of the old German states to be subordinated to those of Alsace-Lorraine.

Mülhausen continued to progress but not so fast as in the middle of the nineteenth century. Together with Dornach, which was consolidated with it, the population had reached 100,000 before the war.

In the annexed part of Lorraine the population massed itself about the factories in the valley of the Moselle between Metz and Diedenhofen. Metz, in 1910, had a population of 68,598, and if the suburbs be included, nearly 95,000. This large figure is due to the enormous garrison stationed there (25,000 men, including the suburbs). Living apart from the industrial activities of the surrounding country, the unfortunate city has now become a mere barracks; its old bourgeois families have all emigrated and it remains denuded and defiant. Nowhere else has the burden of annexation been heavier or more unendurable.

In the part that remained French, aside from Belfort (39,371 inhabitants in 1911), Épinal (30,042 inhabitants), and the little industrial towns in the Vosges, Nancy is the principal point of interest. The erstwhile elegant capital of the Dukes of Lorraine has gained since 1871 all that Metz has lost. In 1911 its population was 119,949. The discovery of the deposits at Briey is due to her scientists and engineers, and her rise dates from this period. Through the activities of her commercial banks and of her Chamber of Commerce, with the aid of her university and scientific institutions, she has methodically, without haste or friction, proceeded "in the Lorraine manner" to develop her wealth. Today she is reaping the benefits of a geographical position whose advantages she had been slow to appreciate. She is one of the regional metropolises of France.

Rise of German Industries and German Imperialism

RAPID TRANSFORMATION

While this evolution was taking place on both sides of France's eastern frontier, Germany also was undergoing a transformation and a much more rapid one. Her tremendous development is due primarily to the exploitation of her coal. From 1880 to 1913, her production of coal and lignite rose from 53,000,000 to 277,000,000 tons.¹⁴ That of England during the same period only rose from 149,000,000 to 286,000,000 tons. Once established as a great industrial power, Germany ceased to send out into the world those hordes of immigrants which had between 1880 and 1883 totaled annually 200,000 or more. Thereafter the migrations took place

¹⁴ Of which 80,000,000 tons were lignite. This lignite, which is mined in the Cologne region, has one-third of the calorific value of coal. It is made available for industrial use by mixing it with bitumen to make briquettes.

within the realm, from the country to the cities, to the detriment of the former. The number of Germans living in the cities had, by 1895, become greater than those in the rural districts. Germany was compelled to get from abroad the labor she needed, not only for her factories but also for her fields. Before the war 275,000 Slav workmen crossed her eastern frontier every year to work in the estates of the great landed proprietors of the east.¹⁵ The majority of these were Poles, and it can be seen what interest Germany would have in seeing her own dominion or that of Austria-Hungary extended so as to include Poland.

GERMAN PROJECTS OF EXTENSION AND DOMINATION

Great industries make imperative demands. To realize on their enormous invested capital and provide for amortization, they must constantly enlarge their production and extend their market. When the home markets no longer suffice, others must be sought outside of the country. Germany exercised all her ingenuity in finding outlets, and if she did not exactly invent the system of dumping she practiced it on a large scale.

Foreign markets, however, are always precarious, for a country that is threatened with industrial invasion will manage to protect itself. How much safer to stay within one's own domain! So the idea of extending her domain became an obsession with Germany. Her geographers began to enunciate the theory of space, *Raum*, considered as a fundamental principle, as a condition necessary to the vitality and prosperity of a state. A league for the extension of Germany was formed which soon became a power with which the leaders had to reckon.

It is obvious that great extent of territory is an advantage, that a large country with all the resources that it can command is better equipped for war than a small country that depends upon the assistance of its neighbors for its very existence. But this theory of extension of territory presupposes the fact that the territory is unoccupied. The United States has been able to spread out over almost an entire continent because that continent was practically uninhabited. Germany could not spread out similarly in Europe without engaging in conflict with her neighbors; and outside of Europe, in the colonial field, the best places had already been pre-empted.

The great material prosperity of Germany was one of the results of the founding of the Empire, which had brought about a unification of all Germany. Prussia owed her dominion to her military successes; she had won it by force. The idea of force as a necessary weapon for all material progress naturally allied itself with the idea of territorial extension. The theory of space was supported by that of force.

Thus developed the conception that Germany has tried to materialize through the present war. To extend her boundaries in every direction by

¹⁵ 274,443 during the economic year 1911-12; 279,833 in 1912-13, of whom 259,413 were Poles (*Statistisches Jahrbuch für das Deutsche Reich*). The economic year runs from October 1 to September 30.

actual or indirect annexations; to surround herself with satellites who were no longer free except in outward seeming; to reach out to the eastward, where she anticipated less resistance and hoped to draw into her orbit Austria-Hungary, the Balkan States, and the Turkish Empire; and even to reach the Indian Ocean—this was her ambition. The building of the Bagdad Railway was the most obvious outward sign of it. The dream of Hamburg-to-the-Persian-Gulf came near to being realized.

RIGHTS OF NATIONS

Opposed to this conception is a totally different one, founded on a respect for the rights of all nations. This theory does not exalt so-called economic necessities above all other interests. It realizes that nations are realities, having the right to live; that political boundaries are not necessarily obstacles to the currents of trade but that on the contrary the close interrelation of interests nowadays makes a good understanding among nations more necessary than ever. "The group idea," says Professor Vidal de la Blache, "must replace the idea of the state in the conduct of the world's affairs."

The great American Revolution set forth this right of peoples to be the masters of their own destinies. It became the doctrine of the French Revolution. Lazare Carnot enunciated this principle in his instructions to the ambassadors of the Republic. "Nations in their relations with each other stand on the same ground as do individuals in private life," he wrote; "like them they each have certain rights, and natural law demands that these rights shall be mutually respected."

THE SPIRIT OF WESTERN EUROPE

This noble idea that justice should rule among peoples as it does among individuals outlived the follies of the First Empire and inspired most of the political changes that took place in Europe between 1815 and 1860, such as the independence of Belgium, the liberation of Greece, and that of the principalities along the Danube. It has found its most powerful champions among the Western Powers. In France and England of the time originated most of the movements of popular sympathy toward subject races. The two Governments were not always on the happiest terms, it is true, and the *entente cordiale* suffered many an eclipse; but there, in those two countries, shone the far-reaching light of liberalism. Thus manifested itself the influence of a long civilization in common, all the more forcefully as England increasingly evolved toward democracy.

Western Europe, which has had the advantage of a continuous development without prolonged interruption since Roman times, is "an aggregation of nations with their own personality, conscious and jealous of their autonomy. Numerical or territorial inferiority does not in any way diminish the ardor of their national self-consciousness. It is kept alive by

historic memories, the sacred heritage transmitted from one generation to another. Holland and Switzerland find in the recollection of their struggles for independence, Belgium in her vigorous municipal life, Portugal in her ancient colonial glory, the sacrament that rallies and sustains them, and they would look upon their absorption by another power as the ultimate disaster."¹⁶

"A society where man, either as an individual or in his relations to a particular group, is accorded that respect to which he is entitled deserves to be considered superior to one where man's personal independence is subordinated to ends determined upon by an entity called the State. The principles which Western Europe has adopted as the basis of its political existence and which she imparted to the New World are not a starting point, to be outdistanced, but a goal, an accomplishment—the focus of the converging tendencies of a long civilization. The happenings in the world today show that Germany has consistently kept herself aloof from these principles."¹⁷

European Importance of Alsace and Lorraine

France's position in this group of Western nations that rallied almost instinctively at the first signs of peril was somewhat different from that of all the rest, for it was against her frontier that the power of German expansion was hurled and it was eastern France which was at stake, as indeed it has been for the last century, ever since Prussia has dominated Germany.

THE ADVENT OF PRUSSIA

Prussia is a late comer in the lands along the Rhine. In the seventeenth century the Duchy of Cleves, along the lower part of the river near the Low Countries, and the County of Mark, farther eastward on both sides of the Ruhr, came by inheritance into the possession of the House of Hohenzollern—a heritage, to be sure, which had long been a matter of controversy. The lands were distant ones having no connection with the kingdom. The Congress of Vienna in 1815 rashly installed Prussia in Treves, Coblenz, Cologne, and Aix-la-Chapelle, in those Rhine provinces where she was not wanted and where she had no right to be. At once her passion for conquest asserted itself. The Treaty of Paris of May 30, 1814, restored to France her boundaries as they existed before the Revolution and gave her the greater part of the Saar valley, with the fortress of Saarlouis, built at the end of the seventeenth century for the defense of Lorraine, as well as the Saarbrücken coal fields, which French mining engineers had been studying with a view to their systematic exploitation. By the second Treaty of Paris, November 20, 1815, Prussia managed to

¹⁶ Vidal de la Blache, *op. cit.*, pp. 206-207.

¹⁷ *Ibid.*, p. 208.

have assigned to her not only the Saarbrücken coal basin but also the French lands of Sarrelouis. She would have liked to acquire even more. This first amputation made a breach in the frontier of France.

THE SAARBRÜCKEN COAL FIELD

Concerning the too little known reasons which influenced Prussia to claim the Saarbrücken basin, Professor Vidal de la Blache brings some evidence to bear whose importance cannot be overlooked. The most interested advocate of these claims was a man named Böcking, who was born at Trarbach on the Moselle in 1785 and was educated in the Prussian County of Mark at Iserlohn in the iron district. He had established himself at Saarbrücken in 1808 and had married the daughter of the ironmaster Stumm. When the Prussian plenipotentiaries passed through Saarbrücken on their way to Paris in July, 1815, he had a number of conferences with them, which he later renewed in Paris when he went there as a delegate. The memorial he wrote at that time to expound his views has been preserved. It is manifestly inspired by the Prussian metallurgists of Westphalia, whose mouthpiece Böcking was. "The German provinces," he said, "are dependent on France for salt. Germany pays out enormous sums for it which she could save if by the possession of the coal fields she were in a position to regulate the price of salt.¹⁸ The steel works at Saarbrücken must be taken into consideration also. It is at present impossible for the Prussian steel manufacturers to compete with them, for the French government has put a tariff of 49.50 francs on every 100 kilos of steel imported. If Saarbrücken be given to Prussia France will be obliged to get her steel from us and will lower her tariff to the great advantage of the foundries of the Mark and the lower Rhine provinces."¹⁹

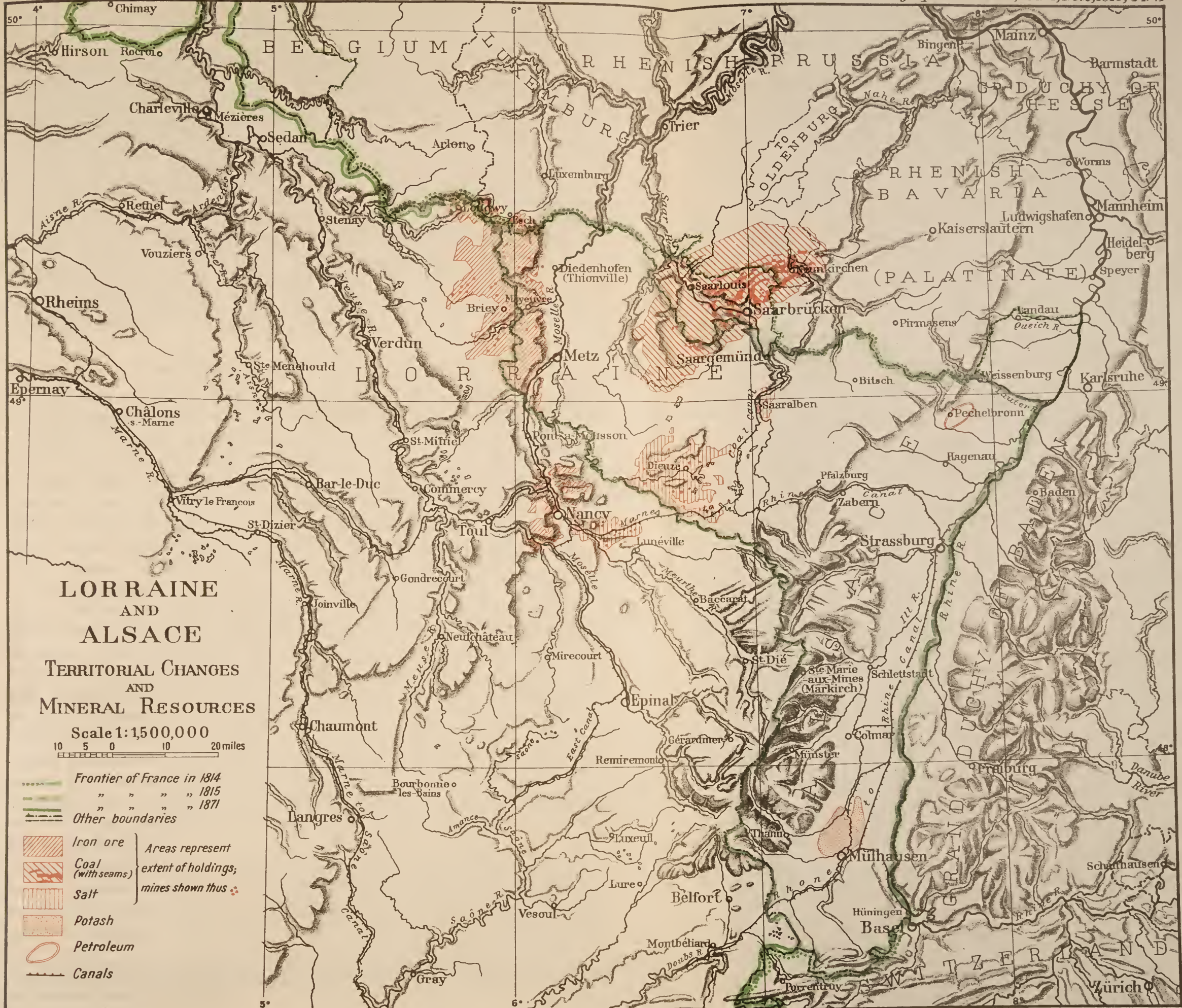
"RECTIFICATION OF THE FRONTIER"

The treaty of 1871 was to furnish new proof of the extent of German covetousness. The determination of Bismarck, apprised by the engineer Hanchecorne, to wrest from France the greater part of the iron ore districts along the Moselle is well known. At that time the wealth that was hidden under the subsoil of the Briey plateau was undreamed of. Germany of today no longer disguises her intention of taking all of the Briey and Longwy districts; the general convention of the iron and steel industries has recently proclaimed the absolute necessity of this step. Even those apparently most conservative, those who will not hear of annexations, speak of this as a "small rectification of the frontier."

This small rectification of the frontier would put France, and all Europe

¹⁸ This refers to the salt mines of Lorraine, which used the Saarbrücken coal as fuel for the evaporation of the saline waters.

¹⁹ Böcking means the provinces annexed by Prussia on both sides of the Rhine.



with her, at Germany's mercy. Germany's iron and steel production is today much greater than England's (9,000 tons for England against 15,600 tons for Germany in 1913) and is surpassed only by that of the United States (31,800 tons). Germany owes her superiority mainly to the Lorraine ores. In 1913 she mined 28,000,000 tons of iron ores, 21,000,000 of which came from the annexed districts of Lorraine. In the same year her factories used 42,000,000 tons of ore. The annexation of the Briey basin alone would give her 15,000,000 more, and this figure will be greatly exceeded when the mines are fully exploited. The adjoining Longwy basin in 1913 produced 2,700,000 tons; the Luxemburg basin, part of which is already within her grasp, produced 6,500,000.²⁰ She would then own all the ore, more ore than she needs, just as she now owns all the coal. She could dominate all the metallurgical industries.

THE RHINE AS A HIGHWAY OF COMMERCE

The treaty of 1871 assured to Germany another advantage. The Rhine is an international river. It rises in Switzerland and ends in Holland. The Congress of Vienna in 1815 had proclaimed its freedom of navigation, and this principle was confirmed in 1868 at the Conference of Mannheim, in which France took part as a riparian state. As a matter of actual fact Germany since 1871 has been practically mistress of navigation on the Rhine, and this navigation has increased enormously. The tonnage of the Rhine ports below Strasburg, which in 1890 was considerable (25,000,000 tons), reached 83,000,000 tons in 1912. The greater part of this is due to the transportation of ores and coal. Of the 16,000,000 tons imported up the Rhine from Holland, 8,000,000 tons are iron ores. They are ores from Sweden and Spain, brought by sea to Rotterdam and transhipped to barges which take them up to Ruhrort, the great river port of the Rhenish and Westphalian region. From Ruhrort a double stream goes out; 7,000,000 tons of coal go down to the Low Countries, 7,000,000 more go up to Mannheim and, beyond, to Strasburg, which has become the real head of navigation on the Rhine. The projects under way to render the stream navigable as far as Basel, or even up to Lake Constance, are well known, as is the decision recently made by Germany to dig a canal between the Rhine and the Danube. Thus she would have a system of navigation entirely in her possession and to her advantage extending from the North Sea to the Black Sea.

The following passage from the confidential memorandum addressed to the Imperial Chancellor on May 20, 1915, by the six great industrial societies of Germany is noteworthy. "Today coal is one of the most decisive means of influence. The neutral industrial states are obliged to obey the

²⁰ Of the 46 blast furnaces in 1913 in the Grand Duchy of Luxemburg, the Germans owned 27. Of six mining companies there three are German, three are owned by Luxemburgers or Belgians. Of the three most important ones, two are German.

commands of that one of the belligerents who can furnish them with coal." The Rhine today is the highway for all the coal that comes from the Westphalian mines. The possession by Germany alone of a waterway which would be the axis of the Mittel Europa she dreamed of would give her a power of economic domination whose menace to the liberty of other peoples need not be emphasized.

THE CANAL SYSTEM AND ITS CONTINENTAL RELATIONS

It is not necessary nor desirable to prevent the union of the Rhine and the Danube or the creation of a navigable waterway which would bring Western and Eastern Europe closer to each other, but it is important that such a waterway should not become a German monopoly. Alsace abuts on the Rhine for about 110 miles and lies along that part of the river which communicates most easily with Western Europe and the Mediterranean. This communication had already been achieved by France during the nineteenth century by means of a network of canals. As early as 1832 she had built the canal from the Rhone to the Rhine, with Mülhausen and Strasburg as termini and a branch reaching to Hüningen, that is to the gates of Basel. In 1854 she finished the Marne-Rhine canal which crosses the Vosges and joins the Rhine to the Moselle, the Marne, and the Seine. In 1866 she opened the Coal Canal, which connects the Saarbrücken coal region with the Marne-Rhine canal. This new waterway made possible cheap transportation of Saarbrücken coal to Alsace and Lorraine. It has been of inestimable value to the Prussian government, which exploited practically all the mines.²¹

This network has partly fallen into disuse since 1871. The Rhine-Rhone canal particularly is of little service at the present time.²² Has not Europe, nevertheless, an interest in seeing Basel, that great junction of routes, put in touch with Lyons and the Mediterranean by means of the great natural highway afforded by the Gap of Belfort, and also in seeing the port of Strasburg realize every possible advantage from the canals that connect her with all the ramifications of the French system, with Havre and Dunkirk, the North Sea, and the English Channel?

"All the measures that can be taken to establish and maintain intercourse from one end to the other of the continent and to encourage the free interchange of varied influences . . . serve the cause of freedom. We must strive to keep this continent, which could be dammed up and exploited by a single great power, open to reciprocal relations and we must make its every part accessible and more easily permeable."²³

²¹ The costs of constructing the canal were chiefly borne by France—15,640,000 francs as against 3,500,000 paid by Prussia.

²² Between Mülhausen and Besançon it is now too shallow. The Germans deepened it only between Mülhausen and Strasburg. Work on the branch from Mülhausen to Hüningen was started in 1914, but no agreement was reached concerning the deepening of the canal on both sides of the frontier.

²³ Vidal de la Blache, *op. cit.*, pp. 231-232.

THE POSITION AND VALUE OF FRANCE

Germany has unmasked other ambitions. She hopes to dominate Belgium, at least economically, to get her hands on Antwerp, which by its canals is one of the outlet ports of the Rhine. She even expects to assure herself of the mastery of all the coast from the Scheldt to Calais. If ever this dream were realized the whole industrial region of northern France would come under German control. Deprived of free access to the ports which it needs, how could it live? France would be crippled in two of her greatest centers of activity, the north and the east, the region of coal and the region of iron.²⁴

If France be considered a safeguard of the liberties of Europe, she must keep a foothold on the shores of the North Sea, regain her access to the Rhine, and reopen that series of waterways provided by nature which unite the Rhine to the Atlantic and the Mediterranean. If she be considered of use in bringing about the triumph of those great causes which she has always defended, she must herself remain powerful. Destined by her geographical position to serve as a rampart for Western civilization, she must conserve her resources to assure herself freedom of action.

²⁴ 90 per cent of the iron ores in France comes from the part of Lorraine that is still French. Two-thirds of her coal comes from her northern mines.

TWO TRAVERSES ACROSS UNGAVA PENINSULA, LABRADOR*

By ROBERT J. FLAHERTY

[With separate map, Pl. VII, facing p. 128.]

In a previous article on an exploration of the Belcher Islands lying off the east coast of Hudson Bay,¹ one of the expeditions conducted by the writer for Sir William Mackenzie, president of the Canadian Northern Railway, I mentioned that, upon failure to cross to the islands over the sea ice from Great Whale River post in March, 1912, our expedition resolved itself into two traverses of the Ungava Peninsula undertaken for the purpose of intercepting on or near tide water a possible northward extension of the Animikean ore-bearing rocks which Low in 1893 had discovered along the lower reaches of the Koksoak River, a hundred to a hundred and fifty miles inland from Ungava Bay.²

Traverse via Lake Minto and Leaf River

The point on the Ungava seaboard where I hoped to find the extension of this rock system was Leaf Gulf, which lies some hundred miles north of the Hudson's Bay Company's post at Fort Chimo. Into Leaf Gulf discharges the Leaf River, which in turn is the discharge of Lake Minto (Kasiagahk, the "Great Seal Lake" of the Eskimos), which lies some forty miles inland from the coast of Hudson Bay about in latitude 57° N. Low, penetrating inland in 1898 from White Whale Point, 150 miles north of Great Whale River, reached the lake, which he called Lake Minto, and explored its course eastward for a distance of forty miles until the starving condition of his dogs forced him to retreat to the sea coast.³

I followed Low's old route, completed the traverse of Lake Minto—which I may here mention was found to have a length of approximately 115 miles and is therefore the largest known lake in eastern Canada north of the St. Lawrence watershed—and from its outlet descended the river to the sea, thus completing the most northerly traverse and the first sea-to-sea sledge exploration of the Ungava Peninsula.

* By Ungava Peninsula is here meant the peninsula lying between Hudson and Ungava Bays.

¹ The Belcher Islands of Hudson Bay: Their Discovery and Exploration, *Geogr. Rev.*, June, 1918, Vol. 5 pp. 433-458.

² See A. P. Low: Report on Explorations in the Labrador Peninsula along the East Main, Koksoak, Hamilton, Manicouagan and Portions of Other Rivers in 1892-93-94-95, Report L of *Annual Rept. Geol. Survey of Canada*, Vol. 8 for 1895, Ottawa, 1896.

³ A. P. Low: Report on an Exploration of the East Coast of Hudson Bay from Cape Wolstenholme to the South End of James Bay, Report D of *Annual Rept. Geol. Survey of Canada*, Vol. 13 for 1900, Ottawa, 1902, p. 34.

PREVIOUS EXPLORATIONS

The route of the most northerly traverse previously made (all of them by canoe in the open season) lay to the southward through the Indian country. This route (see the general map of Ungava Peninsula on Pl. VII), starting from Richmond Gulf and following the Clearwater, the Larch, and the Koksoak Rivers, was first taken by Dr. Mendry in 1824 on his expedition to establish Fort Chimo for the Hudson's Bay Company.⁴ Low made the same crossing in 1896 and mapped and geologically explored the country. Of the area to the northward of this route Low speaks as follows:

There still remains about 120,000 square miles of the northern portion of the peninsula, between Hudson and Ungava Bays, totally unknown to anyone except the wandering bands of Eskimo who occasionally penetrate inland from the coast.⁵

FOOD SUPPLY

This area contains at no point during the winter a game supply that is dependable. We tried for fish on lake and river but were never successful, and but five caribou were seen on all the journey. The vast herds of countless thousands which once ranged throughout the interior have shifted their migrations, south and eastward, so the natives say, to the valley of the Koksoak and the area south of Ungava Bay.

The only dog food we could obtain at Great Whale River post, where we outfitted, was the corn meal and tallow ration used by the fur men, when seal meat is not to be had, for their journeys from post to post along the seaboard. This ration we had to boil with snow water in a half-barrel-size kettle at nightfall every day—a laborious operation requiring two hours, sometimes much longer when our only fuel was the trailing spruces which we burrowed for on hands and knees in the deep winter snow.

METHOD OF TRAVEL

A supplementary supply team accompanied my own thirteen-dog team as far as Lake Minto, where the best twelve dogs were culled from both teams and the auxiliary supply incorporated with my outfit. The journey of some 750 miles to our point of relief, Fort Chimo, was made in thirty-five days—a daily rate, including five full days of stoppage, of twenty miles per day. The masterly driving of my men; their remarkable knowledge of route finding, what one might call “navigation,” through endless wastes of drifting snow; and, more important still, their adaptability, personal co-operation, even comradeship, despite the fact that we had no common language save one of pantomime and the few pronounceable words I could wring from my notebook vocabulary—these were the chief factors in the success of the expedition.

⁴ Low, work cited in footnote 2, p. 15. Dr. Mendry's expedition is the basis of Ballantyne's famous boy's story, "Ungava."

⁵ Work cited in footnote 2, p. 20.



FIG. 1.—The last outposts of the great northern coniferous forest: the tree limit 20 miles west of Fort Chimo.

ROUTE FROM GREAT WHALE RIVER POST TO LAKE MINTO

From Great Whale River post to White Whale Point (57° N.) we sledged along the sea ice outlying the rugged seaboard of Hudson Bay, and from this point struck inland. The coastal range of rugged, treeless granites rises to a maximum altitude of 1,000 feet, to a point some 30 miles inland, where lies the divide between Hudson and Ungava Bays. Small lakes occupy the deep, pockmark-like indentations of the hills in numbers so bewildering as to render travel most confusing. Eastward from the divide to Lake Minto the rugged granite hills gradually lower to long sloping plains, treeless save for waist-high spruces in wind-sheltered, wide-apart pockets of the valleys. Over the face of the country generally, scattered as if by a giant hand, glacial débris, erratic boulder shapes in countless multitude, add chaos to desolation.

LAKE MINTO

Of Lake Minto, Low says:⁶

Kasiagaluk or Lake Minto is one of the largest lakes of the Labrador peninsula, being, according to the Eskimos, upwards of one hundred miles long. The portion explored consisted of two bays, each about forty miles in length, with numerous minor bays running off from both, and the main bodies being covered with large islands. The northern bay is the larger, and varies from two to ten miles in width, while the southern bay is from one to five miles wide. The main body of the lake, at the junction of these western bays, is fully fifteen miles wide, and from there to its eastern end gradually narrows so that it imperceptibly passes into the Leaf River, by which it is discharged into Ungava Bay about half way between Hopes Advance Bay and the mouth of the Koksoak River.

The lake's length, as I have mentioned, was found to be approximately 115 miles. The elevation of the surrounding country does not exceed a maximum of 400 feet, the average being 100 to 150 feet. Trees occur only at widely separated points, often from three to five miles apart, and never grow thickly enough to afford the slightest wind shelter. As the general map on Plate VII shows, the northern shore is at the tree limit. No rock formations other than gneisses and granites were noted.

At one point along the shore we camped near an old tepee frame, erected apparently many years before. The Indians, from their tree country to the south, used to make hunting excursions into this country in summer, in the olden days of the caribou migrations. Nor were their excursions altogether for caribou; they also made raids on the defenseless Eskimos,⁷ who, attracted like themselves by the prospect of deer, ascended the Leaf River from Ungava Bay in kayaks.

The lake is famous among the Eskimos as the habitat of the fresh-water seal, hunted primarily not as food, but for the pelt, which, much darker, softer, and more lustrous than that of the salt-water variety, is used for

⁶ Work cited in footnote 3, p. 34.

⁷ Defenseless in the sense that they were not armed with firearms as were the Indians. Since the time, however, that the Eskimos also have been able to secure firearms from the fur men, they have proved themselves more than a match for their hereditary foes.

their finer garments. Arctic trout, lake trout, and whitefish, common to all the larger lakes of the peninsula, are abundant.

LEAF RIVER

The discharge of Lake Minto, 400 feet in width with an average depth of approximately 10 feet, is the commencement of Leaf River, one of the largest rivers of the Ungava Peninsula. For the first twenty miles it is broken by a series of small lake expansions. The country on either hand lowers to small rounded hills, with inexpressibly welcome little clumps of dwarf trees here and there in sheltering valleys. At one point these attained the proportions of a small grove large enough to afford us a break from the drift. The southing of wind amongst them was reminiscent of real trees and timber.

From one of the lake expansions an old Eskimo migration trail leads eastward overland to the valley of the Koksoak. This trail was much used in the old days when the caribou were plentiful. Our route, on the other hand, along the Leaf to the sea was one not traveled by Eskimos in winter on account of the exceedingly rough ice where the Leaf discharges into Leaf Gulf, a fact which I did not know at the time of our journey, or we, too, should have swung off to the Koksoak, shortening our route to Fort Chimo by over 200 miles.

Where the lake expansions of the river end, flanking ranges of intensely glaciated barren granite rise to an average height of 500 feet from gravel shelves of river plain 1,000 feet in width.

Some 50 miles downstream a large tributary enters from the west, though as a matter of fact it may be the main river, for at its entry it is as large as the Leaf itself, and from its confluence the Leaf widened impressively. Strangely enough, my inquiries among the Ungava Bay natives failed to elicit any information concerning it. As the country is practically untraveled by the modern generation of Eskimos, it is to them, probably, unknown.

There is nowhere on the Leaf any direct fall, and but one long rapid, nine miles in length. The water is clear as crystal, a characteristic of all rivers of the subarctic in contrast to the "tea water" streams of the tree country to the south. Atlantic salmon, Arctic salmon, and whitefish, so say the natives, are abundant along its lower reaches, where the natives fish during the spawning season in July.

NEARING THE SEA

My men were quick to note as indications of our nearness to the sea every stratified band and receded marine terrace, the first of which we came upon some 70 miles from the mouth. The terraces lay, like huge railway embankments in bas relief, plastered along the steeply sloping granite ranges to a height of 200 feet above the river. Their height



FIG. 2.



FIG. 3.

FIG. 2—A clump of dwarf trees in a wind-sheltered pocket near Lake Minto.
 FIG. 3—Preparing for camp, upper Leaf River.

increased to a maximum of 250 feet as we neared the sea, an altitude which roughly corresponds to that of the terraces of Low's report along the lower Koksoak and George Rivers.⁸

The river's final 50 miles averages 1,500 feet in width. The granite ranges which form its V-shaped valley continue their average altitude of 400 to 500 feet. The trees dwarf noticeably with every mile, finally to stunted bushes waist-high and less. While we were luncheoning among them one day a "Whisky Johnnie" joined us at our meal—the only feathered



FIG. 4—On the upper Leaf on the way to Fort Chimo.

creature other than a few ptarmigans and snow buntings that we had seen during the journey.

On April 3, the thermometer rose to zero at midday. The temperature up to this date had averaged -20° for eighteen days, twelve of which were thick with drifting snows and heavy winds, and two with gales. The minimum temperature experienced was -45° , and the maximum, -8° .

LEAF GULF AND FORT CHIMO

Two hundred and forty-five miles from its source, that is the outlet of Lake Minto, the Leaf River debouches over a short series of terraced rapids into a narrow half-sheer, granite-walled fiord of Leaf Gulf. The gulf itself is an unmapped, island-studded expanse some 30 miles long and 25 miles wide. Here we found, as had been hoped, a northward extension of the Animikean rocks discovered by Low along the lower reaches of

⁸ Work cited in footnote 2, p. 309.

the Koksoak. The topography of the intricate island groups and of the southern and eastern seaboard—gently slanting, horizontally stratified, table-topped hills—is strikingly similar to that of the Animikean area in Hudson Bay, although generally much lower, reaching a maximum altitude of 250 feet as compared with 2,000 feet in the Hudson Bay area. The rock series consequently is less graphically exposed.

Like Richmond Gulf with Hudson Bay, Leaf Gulf is connected by a single, gorgelike passage with Ungava Bay, through which the sixty-foot



FIG. 5—Western end of Lake Minto, looking eastward.

tide, one of the highest in the world, flows with such rapidity that most dangerous maelstroms occur. The natives, except at the change of tide, never venture there. A tidal indraft so tremendous makes exceedingly difficult sledge travel from the river's mouth across the gulf, where it rafts the ice to enormous heights. In fact we were a week traveling a distance of 35 miles from the river's mouth to the gulf's southeastern end. Here we gained the natives' overland route, which, starting from the gulf, continues some 80 miles southeasterly to Fort Chimo, where we arrived April 17, 1912.

Traverse via Payne and Povungnituk Rivers

Within a week of my arrival at Fort Chimo I returned to Leaf Gulf and made a fortnight's exploration, which, however, resulted in no mineral finds of importance. Arrived again at Fort Chimo, I awaited the break-up of the ice in the river and in Ungava Bay, when a cruise could be made northward along the coast of the bay to follow the extension of the Animikean

series northward from Leaf Gulf and complete this exploration to its northernmost limit. I then planned to cross the peninsula again, westward to Hudson Bay, following approximately the 60th parallel. The traverse would be of some geographical interest as it would practically bisect the area remaining north of my sledge trip. Upon arrival on Hudson Bay I planned to continue northward to Hudson Strait at Cape Wolstenholme, where, by intercepting the Hudson's Bay Company's annual fur ship, I should be able to gain passage out to Lower Canada.

CHARACTER OF THE NORTHERN PART OF THE PENINSULA

North of the line of our sledge trip the Ungava Peninsula is wholly arctic in type, being altogether treeless and devoid of vegetation save for the flowering plants, mosses, and lichens characteristic of the arctic regions. Though its seaboard has been cruised by explorers, what is known of the vast interior is derived solely from the information of the Eskimos. According to them it is, generally speaking, a rolling plateau of low, long-sloping hills, everywhere intersected by countless thousands of lakes and connecting streams. Snow never leaves the higher ground, and ice in the larger lake systems remains the year through. The country round about the headwaters of the larger riverways, like that about Lake Minto, was a common meeting ground in the old deer-hunting days for the Eskimos of both bays, who journeyed there from east and west at the fording season of the migratory caribou.

ESKIMO KNOWLEDGE OF THE REGION

Of the present generation of Fort Chimo Eskimos, several had many years before hunted inland along the Ungava Bay slope as far as the drainage divide. With the rivers of this area therefore they were to some extent conversant, but over the divide to the region sloping towards Hudson Bay none had traveled.

Of the old travel routes for Ungava Bay hunters the principal one is by way of the Payne, the largest river to northward of the Leaf and the outlet of a large interior lake, which, according to the natives' descriptions, may be the largest body of fresh water in all Ungava and was at one time the most famous deer-hunting ground of the northern interior. Though no information was accessible as to the water route beyond the divide west of Payne Lake, the route by which the natives from Hudson Bay ascended to the lake hunting-grounds could, no doubt, be located by a reconnaissance of the lake's western end.

A NEW CREW AND OUTFIT

Omarolluk and Wetunik, now that navigation had opened, were anxious to return to their families at Great Whale River. Accordingly they were outfitted with canoes and supplies and camping gear, and sent on their way via the old Mendry route to Hudson Bay. My new crew of four comprised



FIG. 6.



FIG. 7.



FIG. 8.

FIG. 6—Fort Chimo, showing the Koksoak River, a mile and a half broad at this point.
 FIG. 7—Northeastern coast of Hudson's Bay near Cape Smith (61° N.). Sea pigeons on the rocks.
 FIG. 8—A fall 35 feet high on the lower Povungnituk River.

Nuckey, an active little chap, who, owing to his sophistication in the ways of white men, was appointed head man; Nawri (the Gull), a native from Cape Hopes Advance; Awari, from Leaf Gulf; and Areghick (the Partridge), from the Koksoak.

For outfit we had two fly-proof, canvas floor tents, made by the servant women of the post and sewn with deer sinew; the usual beans, bacon, apricot, sea biscuit, and tea; adequate hunting gear—fish nets, cod lines, and snare wire, besides arms and ammunition; and a 25-foot Peterboro canoe of 4,500 pounds capacity, which, though it weighed some 200 pounds and was therefore a burdensome craft for carrying over portages, was well adapted for the final stretch of coastwise cruising.

THE UNGAVA COAST AND PAYNE BAY

To Payne Bay we were to travel with a crew of Eskimos in one of the Company's small coastwise craft, a 29-foot sloop, the *Walrus*, bound on a seal-hunting expedition. From the point of debarkation at the mouth of the Payne my men and I were to continue by canoe up-river and across the peninsula.

The Ungava coast northward from the mouth of the Koksoak to Payne Bay, as far as I could see while cruising its outlying waters, is formed of low-lying hills and plains. Its offshore shoals combined with the enormous tidal ebb and flow make it practically unapproachable for deep-sea ships. Where we detoured the mouth of the Leaf Gulf outlet I noted large ice floes sweeping out to sea at tugboat speed.

As regards the reconnaissance examination of the coastal rock formation I had intended to make, the cruise proved a failure, for, hardly a day beyond the mouth of the Koksoak, ice fields closed in on the coast, imprisoning us at various of the innumerable small islands which mask the actual shore line four to ten miles out to sea, while from Leaf Gulf northward coastal waters were so shallow that vast fields of ice were grounded there, preventing our approach to the mainland. Only by taking advantage of lanes as they opened under the influence of the tides were we enabled to gain small distances to northward, never more than twenty miles in a single day, often but three or four. At the end of two weeks and four days we arrived off the partly ice-free entrance to Payne Bay.

Payne Bay, the deepest indentation of Ungava Bay, is 40 miles deep with a maximum width of 14 miles. Its shore line is more rugged than that to the south, and this ruggedness increases to barren precipitous granite hills rising to an altitude of 600 feet as one travels inland to head of tide. The rock formation is nearly all granites and gneisses, save for a small area near the mouth of the bay, where occur some Animikean rocks, which, however, are of no economic interest.

As one nears the estuary of the Payne the hills fall half sheer and without shore-line benches into the sea. These granite walls, intensely glaciated,

are cross-grained by enormous bands of eruptive dikes, that from the distance appear like gigantic jet ribbons laid over the hills. Along the plateau slopes winter snow lies patched over half the area, and this combined with an almost complete absence of so inconspicuous vegetation as moss lends the region a particularly desolate aspect.

UP THE PAYNE RIVER

The Payne at its mouth, according to Low who explored the coast line, is larger in volume than the Gatineau of the Ottawa River system of Lower Canada.⁹ A half mile in width, it debouches from a canyon and, like a skein of white, threads through groups of boulder bars and islands. Granite ranges rising almost precipitously to a height varying from 300 to 600 feet bound the river's course continuously for twenty miles. Marine terraces were noted almost everywhere, plastered to the slopes to a maximum height of 300 feet. The rugged grandeur of the ranges, the bright green shrubbery edging the snow patches here and there, the white-veiled torrents that plunged sparkling in the sunshine to the river, the banks of flowers, solid masses of color, purple and white, with hovering bumblebees and butterflies—were enchanting pictures.



FIG. 9—The divide between Hudson and Ungava Bays near the western end of Lake Minto.

THE NATIVES

What was to prove our only meeting with natives through all the interior occurred thirty miles inland, when, as we were sailing before a light draft of wind, Nawri suddenly called "Innuet" and pointed ahead to a kayak quickly scooting out from the shore to an island rock. As we drew nearer we saw the kayaker peering at us from behind a screen of boulders on the island's crest. At shouting range Nawri called "Chimo." He stood up then and in a queer tremulous voice answered. It was plain he knew not what to make of us; but soon, reassured, he paddled alongside and became quite happy when the men explained our presence. As we neared his

⁹ A. P. Low: Report on an Exploration of Part of the South Shore of Hudson Strait and of Ungava Bay, Report L of *Annual Rept. Geol. Survey of Canada*, Vol. 11 for 1898, Ottawa, 1901; reference on p. 23.

eneampment he called out to his huddled family, jokingly, something about the Adelite (Indian) coming. Even to this day the Indian is dreaded. This native, whose name was Gwaek, together with his family, a grown-up son, two wives, a grandmother, some half dozen small children, an army of dogs, and a tame sea gull tied by a thong, was living on the Arctic salmon resources of the river near by. A plentiful supply, cleaned and split, was spread about on the ground euring in the sun.



FIG. 10—Omarolluk, the head driver on the sledge expedition.

The one dependable source of food supply for the natives who travel the interior in summer is fish, particularly the *namay-cush*, the great lake trout, and a finer eating fish does not exist. We caught them up to four feet in length with eod hooks, baited with pork and red flannel, so easily that we had no occasion to use our nets during the entire journey.

Nawri mentioned that Gwaek was a Great Whale River Eskimo and that he had through the preceding months of winter hunted his way to the Payne with dogs and sledge through the waterways of the interior. From Great Whale River to this point seemed to me a hazardous journey, as he would have to take circuitous courses and fish through the ice for food. Far journeys have been made by

criminal Eskimos, fleeing from the vengeance of their fellows, and Gwaek's presence here, a hundred miles beyond the habitation of his people, seemed strongly indicative of something irregular. Nor did he look at all incapable of it. He was bald to the ears—the only bald native I have ever seen—which, combined with his sinister, weather-scarred mask, made him not a prepossessing object, to say the least.

UP A TRIBUTARY OF THE PAYNE

Some ten miles onward from Gwaek's eneampment we came to a large tributary of the river. Descending from the southwest lay the main river's course, which within two days, my men said, would bring us to the outlet of Payne Lake. Across this lake, the reader will remember, it was our

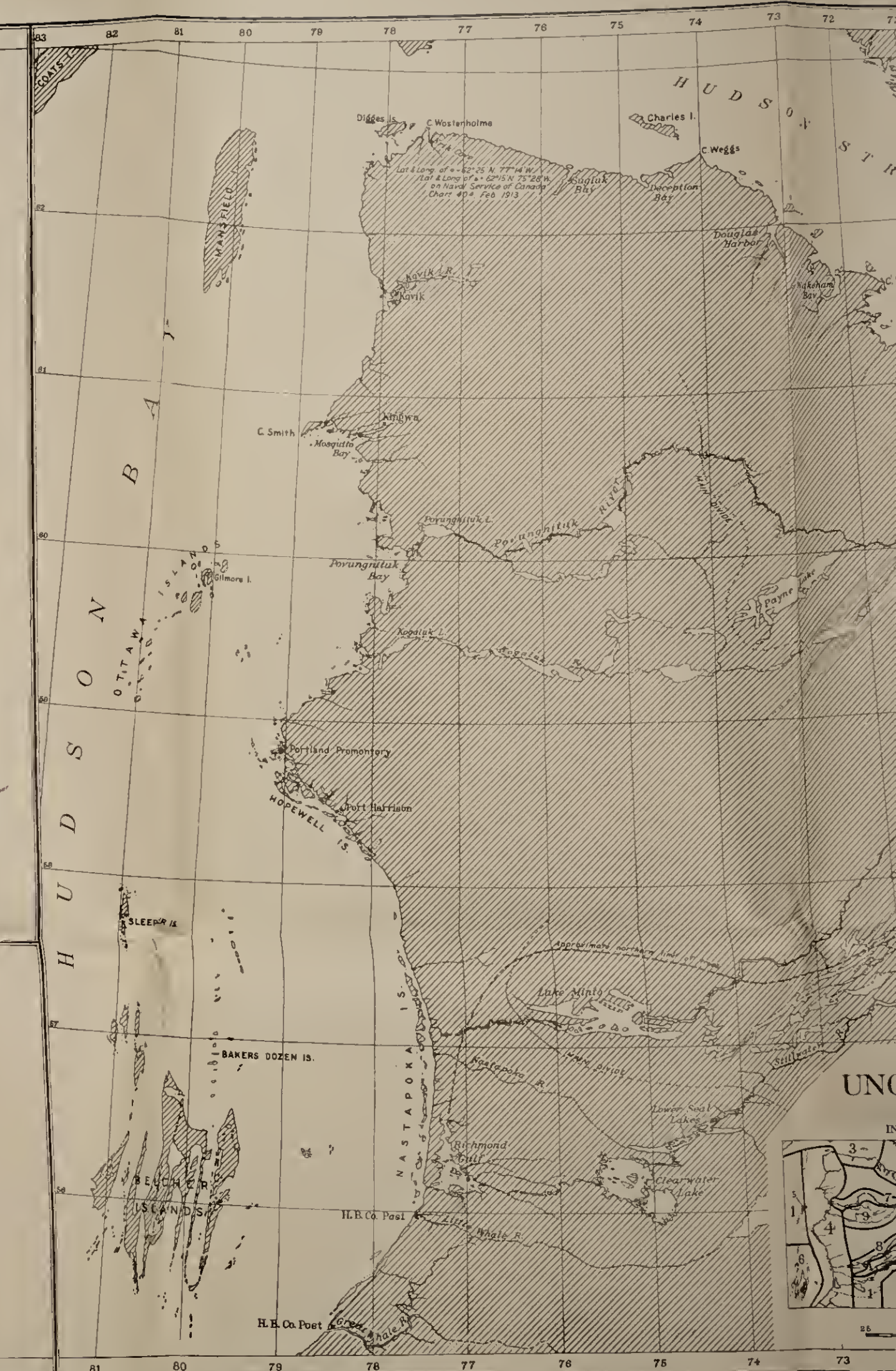
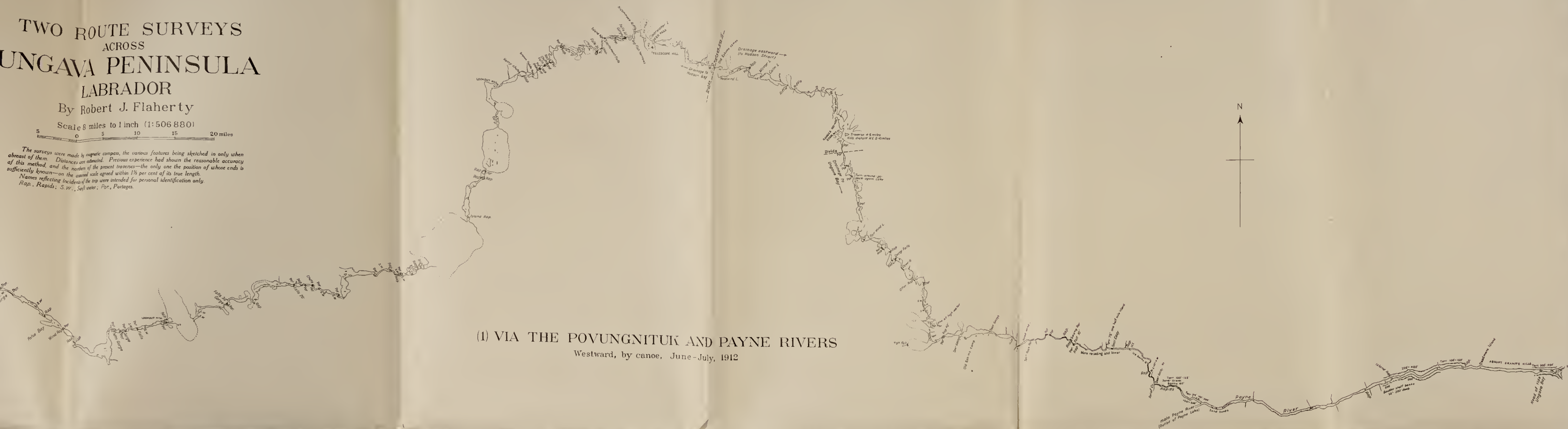
TWO ROUTE SURVEYS ACROSS UNGAVA PENINSULA LABRADOR

By Robert J. Flaherty

Scale 8 miles to 1 inch (1:506880)

5 10 15 20 miles

The surveys were made by magnetic compass, the various features being sketched in only when abreast of them. Distances are estimated. Previous experience had shown the reasonable accuracy of this method, and the position of the present traverse—the only one the position of whose ends is sufficiently known—on the usual scale agreed within 1 1/2 per cent of its true length. Names reflecting incidents of the trip were intended for personal identification only. Rap., Rapids; S.W., Sea water; Por., Portage.



intention to travel; but of late we had encountered much sunken ice along the river banks, strong indication that the lake was not altogether free of ice, and this raised the question as to whether our progress across it might not be altogether barred. On the other hand, the river entering from the northwest drained an area of small lakes which for the most part were shoal and on that account more likely to be free of ice obstructions, so the men explained. Tracing on the sand its approximate course, Nawri, the only man who had traveled the stream, showed us that though broken by many portages it was feasible of ascent. From the divide beyond it, Nawri said, we should find a water route to Hudson Bay which had been much used in the old deer-hunting days by the Hudson Bay natives. Accordingly we decided to abandon the Payne, though with much regret at losing an opportunity to explore what may be one of the largest lakes in all Labrador.

Not a mile beyond its beginning the new route became much broken by rapids and narrowed to what was nothing more than a V-shaped trough where ice embankments, ten to twenty feet high, stranded by the river's recession from the floods of earlier weeks, made treacherous tracking ground.

DESOLATE REGION

The countryside became increasingly desolate, boulder-strewn everywhere and snow-patched over its greater area. We met with nesting black and red-throated loons and circling gulls along the gravel shores of every lake expansion. Loons I have never before or since encountered in such numbers; every tiny lake had its families of them; their melancholy hallooing and the forlorn creaking of gulls were the only living sounds.

Hundreds of thousands of migratory caribou must have ranged through this country in former years, judging by the number of old fording trails and deer decoys we met with. Deer decoys are groups of large erratic boulders, each boulder topped with a smaller one. Viewed from a distance they look not unlike a herd of grazing deer. The efforts of many generations alone could account for their aggregation. How complete is the absence of deer at the present time may be realized from the fact that we saw but one on the whole traverse.

Along its upper waters the tributary we followed from the Payne was a heart-breaking succession of boulder-strewn portages and confusing lake-expansions. Such intricate waterways I never before had traveled; they were merely shallows in the country's saucer-like depressions, so shallow that one could oftentimes wade them. Their shore lines were so gradually sloping, so lacking in contrast owing to the absence of all color save the wearying dominant note of leaden gray, that we sometimes imagined as we entered them that large traverses lay before us. Even at a distance of three or four miles a haze bathed the gray, barren rocks, enhancing the illusion. The larger of them all contained winter's ice; some were covered

with solid sun-blackened fields, save for narrow margins along the shore line, where we traveled on sinuous courses.

The increasing shoalness of the lakes, the larger extent of gravel areas, and the comparative dearth of even moss indicated our approach to a divide, which, on July 17, having reached a point where our frothy river dwindled to an insignificant creek and was no longer navigable, we crossed and entered an area which may drain to Hudson Strait.



FIG. 11—Eskimo in kayak with harpoon attached by a line to an inflated sealskin to insure its recovery.

OVER THE DIVIDE TO THE POVUNGNITUK

For three days together on this divide gales with rain and snow held us storm-bound, soaked our moss fuel, and reduced our fare to sea biscuit and cold water. From the time we left the estuary of the Payne moss had constituted our sole fuel. In preparation for the cooking of our meals we gathered it in a dozen or more heaping armfuls. Rectangles of stones, two of them holding our kettles, the third our frying pan, were our fireplaces. Into them we piled the moss in small quantities. If dry it flared so quickly into flame as to necessitate constant feeding, while if damp, it smoked as offensively as a burning rag, which meant dripping eyes, grimy faces, and pungently smoked tea and beans.

Along the western slope, immediately beyond the divide, there was much circuitous traveling over little lakes before we finally came to a second—the Hudson Bay—divide and reached a river of such surprising size that we knew in a moment we had passed, unknowing, a large stream entering some-

where on its northern shore the lake behind us. As it afterward proved the river we now entered was the Povungnituk. How much farther to north-eastward it extends I had no means of ascertaining nor could subsequent investigation among the Eskimos along the Hudson Bay seaboard determine. The source lies probably in the mountainous coastal range of Hudson Strait, somewhere between Sugluk and Wakeham Bays.

The river, even larger than the Payne at its outlet from the lake,



FIG. 12—Eskimo father and child returning from their fishing. Rock cod on the kayak.

descends over rugged terraces and precipitous falls that involved much difficult portaging. But soon we came into more hospitable country, open and rolling to far distances. There were ripe berries in abundance and wild flowers and luxuriant growths of willow along the river banks. We were keen to look for any indication of our nearness to the sea. On one large expanse, whose horizon appeared to be landless, the crew cried, "Tiahoke," but Nawri, tasting the water, turned and said with a sour smile, "Tessiak tabutaa" (only a lake).

The river's course became increasingly broken with lake expansions as we descended, all containing ice in some quantity but invariably open enough to afford us passageway. Their outlets were difficult to find, entailing much reconnoitering and circuitous shore-line travel. River reaches, tumbling sweeps of deep water, brilliantly transparent to a pebbly white bottom, we descended at racing speed, sometimes for three and four unbroken miles. A splendid canoeing stream, the Povungnituk, certainly the most picturesque I have ever traveled.

THE SEA

Finally, on August 1, we came to a point where the river tumbling through the channels of three large islands, in deep, swift, and easy running rapids, swept out into a long, narrow bay of low gravel shores, kelp-strewn along its tide mark. It was the sea, but Nawri tasted the water to make sure of it.

The Povungnituk, in point of volume, is the largest river discharging into the coast of Hudson Bay. Low estimated its discharge and gives its volume as "nearly equal to that of the Ottawa River."¹⁰

Hoisting sail we bowled along offshore and shortly sighted an encampment of sealskin topeks. Through my glass I noted a single figure scurrying from tent to tent, obviously appraising the occupants of the strangers' craft. As we drew within hearing distance, however, even the scurrying figure had disappeared; only a few dogs could be seen, prowling around the tent doors or sprawled in sleep on the ground. I turned inquiringly to Nawri. "Innuet immaitame," he explained, "that is the custom of the people"; and "Innuet ho, ho," he cried, as we furled-sail before the landing, whereupon the folds of the nearest topek door were thrown open and the occupants filed haltingly out, kapaying their astonishment. A few words from the men and we were all shaking hands. They were a kindly throng, on the alert to help us, fetching us freshly killed salmon, eggs, and berries and, with much interest, lending a hand at our camp making. On the following morning as we raised sail to our unfailing easterly wind and drew rapidly away on the last leg of our journey, up the coast to Wolstenholme, from the crest of a last vantage point, silhouetted against the sky, their arms pointed skyward, their knees flapping in and out in a stilted kind of movement like manikins on a string, they signaled to us in native fashion a final farewell.

¹⁰ Work cited in footnote 3, pp. 12 and 27.

TRAVELING IN CHINA'S SOUTHLAND*

By ROY CHAPMAN ANDREWS

American Museum of Natural History

The last half of the Asiatic Zoölogical Expedition of the American Museum of Natural History began January 13, 1917, when we left Ta-li fu with a caravan of thirty mules for Yung-chang, eight days' travel to the south.

On the way to Yung-chang we crossed a succession of dry, thinly forested mountains from 7,000 to 8,000 feet high which near their summits were often clothed with a thick growth of rhododendron trees. The beautiful flowers flashed like fire balls among the green leaves, peach trees were in full blossom, and in some spots the dry hills seemed about to break forth in the full glory of their spring verdure. We crossed the Mekong near a village called Shui-chai on a picturesque chain suspension bridge of a type which is not unusual in the southern and western part of the province. Several heavy iron chains are firmly fastened to huge rock piers on opposite sides of the river and the roadway is formed by planks laid upon them. Although the bridge shakes and swings in a rather alarming manner when a caravan is crossing, it is perfectly safe if not too heavily loaded.

YUNG-CHANG

In the afternoon of January 21 we rode down the mountain to the great Yung-chang plain, and for two hours trotted over a hard dirt road. The plain is 18 miles long by 6 miles wide and except for its scattered villages is almost entirely devoted to paddy fields. The city itself includes about five thousand houses. It is exceedingly picturesque and is remarkable for its long, straight, and fairly clean streets, which contrast strongly with those of the usual Chinese town. At the west, but still within the city walls, is a picturesque wooded hill occupied by temples.

FOOT BINDING

Yung-chang appears to be almost entirely inhabited by Chinese, and in no part of the province did we see foot binding more in evidence. Practically every woman and girl, regardless of her station in life, was crippled in this brutal way. The women wear long full coats with flaring skirts which hang straight from the shoulders to their knees. When the trousers are tightly wrapped about their shrunken ankles, they look in a side view exactly like huge umbrellas.

* This is the second of two articles dealing with a zoölogical reconnaissance trip across the province of Yün-nan of which the author was leader. The first article, published in the July *Review*, pp. 1-18, carried the expedition from Yün-nan fu to the region of the great bend of the Yangtze River and to Ta-li fu. The present article takes up the narrative at that point. For location of places see the map in the first article.

CAVES AND BATS

One day we visited a cave thirty *li* north of the city where we hoped to find new bats. A beautiful little temple has been built over the entrance to the cavern, which does not extend more than forty or fifty feet into the rock. But twenty *li* south of Yung-chang, just beyond the village of A-shih-wo, there is an enormous cave which is reported to extend entirely through the hill. Whether or not this is true we cannot say, for although we explored it in part we did not reach the end. The central corridor is about thirty feet wide and at least sixty or seventy high. We followed the main gallery for a long distance and turned back at a branch which led off at a sharp angle. We were not equipped with sufficient candles to pursue the exploration more extensively and did not have time to visit it again. The cave contained some beautiful stalactites of considerable size, but the limestone was of a dull lead color. We found only one bat. These animals appear not to have used it extensively as there was little evidence upon the floor.

WATER BUFFALOES

At Yung-chang we saw water buffaloes for the first time in Yün-nan, but farther to the south and west we found them to be in universal use. The huge brutes are as docile as a kitten in the hands of the smallest native child; but they do not like foreigners, and discretion is the better part of valor where they are concerned.

Water buffaloes are only employed for work in the rice fields, but Chinese cows are used as burden bearers in this part of the province. Such caravans travel much more slowly than do mule trains, although the animals are not loaded as heavily. Two or three of the leading cows usually carry upon their backs large bells hung in wooden framework, and the sound is by no means unmusical when heard at a distance.

SHIH-TIEN: FIRST TOUCH OF THE SUBTROPICS

From Yung-chang we traveled southward for two days over bare brown mountain sides, their monotony unrelieved except by groves of planted pine and fir trees, and then descended abruptly into the great subtropical valley at Shih-tien. Mile after mile this fertile plain stretches away in a succession of rice paddys and fields of sugar cane, interspersed with patches of graceful bamboo, their summits drooping like enormous clusters of ostrich plumes; the air is warm and fragrant, and the change from the surrounding hills is delightful. However, we were disappointed in the shooting, for, although it appeared to be an ideal place for ducks and other water birds, we killed only five teal, and the great ponds were almost devoid of bird life. Even herons, so abundant in the north, were conspicuous by their absence; and we saw no sheldrakes, geese, or mallards.

CURIOSITY OF THE NATIVES

At Shih-tien we camped in a beautiful temple yard on the outskirts of the town, and with Wu, the interpreter, I returned to the village to inquire about shooting places. We seated ourselves in the first open tea house and within ten minutes over a hundred natives had filled the room, overflowed through the door and windows, and formed a mass of pushing, crowding bodies which completely blocked the street outside. It was a simple way



FIG. 1—The country between Ta-li fu and Yung-chang. Approach to the subtropics is indicated by the palms in the foreground.

of getting all the village together, and Wu questioned everyone who looked intelligent.

We learned that shooting was to be found near Chên-kang five days' travel to the south, and we returned to the temple just in time to receive a visit from the resident mandarin. He was a good-looking intellectual man with charming manners—one of the most delightful gentlemen we met in China.

During his visit and until dinner was over and we had retired to our tents, hundreds of men, women, and children crowded into the temple yard to gaze curiously at us. After the gates had been closed they climbed the walls and sat upon the tiles like a flock of crows. Their curiosity was insatiable but not unfriendly, and nowhere throughout our expedition did we find such extraordinary interest in our affairs as was manifested by the

people in this immediate region. They were largely Chinese, and most of them must have met foreigners before, yet their curiosity was much greater than that of natives who, we knew, were seeing white persons for the first time.

A SUDDEN CHANGE

On the second day from Shih-tien we climbed a high mountain and wound down a sharp descent for about 4,000 feet into a valley only 2,300 feet above sea level. We had been cold all day on the ridges, exposed to a biting wind, and had bundled ourselves into sweaters and coats over flannel shirts. After going down about a thousand feet we tied our coats to the saddle pockets; on the second thousand we stripped off the sweaters; and for the remainder of the descent rode with sleeves rolled up and shirts open at the throat. We had come from mid-winter into summer in two hours, and the change was most startling. It was as though we had suddenly ridden into an artificially heated building like the rooms for tropical plants at botanical gardens.

STRANGE CONTRASTS

Our camp was on a flat plain just above the river. Here we had a splendid view of the wide valley, which was like the bottom of a well, with high mountains rising abruptly on all sides. It was a place of strange contrasts. The bushes and trees were in full green foliage, but the grass and paddy fields were dry and brown as in mid-winter. The thick trees at the base of the hills were literally alive with doves, but there were few mammal runways and our traps yielded no results. That night a muntjac, the first we had heard, barked hoarsely behind the tents.

The yamen "soldier" who accompanied us from Shih-tien delivered his official dispatch at the village (Meng-po-lo) which lies farther down the valley. The magistrate, who proved to be a Shan native, arrived soon after with ten or twelve men, and we discovered that there was but one man in the village who spoke Chinese.

In the morning the entire valley was filled with a dense white fog; but we climbed out of it almost immediately and by noon were back in winter again on the summits of the ridges. The country through which we passed *en route* to Chên-kang was similar to that which had oppressed us during the preceding week—cultivated valleys between high barren mountains relieved here and there by scattered groves of planted fir trees. It was a region utterly hopeless from a naturalist's standpoint, and when we arrived at a large town near Chên-kang we were well-nigh discouraged.

ANIMAL LIFE AT LAST

With gloom in our hearts which matched that of the weather, we left in a pouring rain on February 5, to slip and splash southward through veritable rivers of mud toward a village called Mêng-ting, where it was said

there was good hunting. In the afternoon of the second day the country suddenly changed. The trail led through a wide grassy valley, bordered by heavily forested hills, into a deep ravine. Along the banks of a clear stream the earth was soft and damp, and the moss-covered logs and dense vegetation made ideal conditions for small mammalian life.

We rode happily up the ravine and stood in a rocky gateway. At the right a tree-clothed mountain rose out of a tangle of luxuriant vegetation;



FIG. 2—The Nam-ting River.

to the left wave after wave of magnificent forested ridges lost themselves in the low-hung clouds; at our feet lay a beautiful valley filled with stately trees which spread into a thick green canopy overhead.

We camped in a clearing just at the edge of the forest. While the tents were being pitched I set a line of traps along the base of the opposite mountain and found a runway under almost every log. About eight o'clock I ran my traps and, with the aid of a lantern, stumbled about in the bushes and high grass, over logs and into holes. When I emptied my pockets there were fifteen mice, rats, shrews, and voles representing seven species *and all new to our collection*. Heller brought in eight specimens and added two new species. We forthwith decided to stay right where we were until this "gold mine" had been exhausted.

During the eight days in which we remained at this camp two hundred specimens, comprising twenty-one species, were added to our collection.

Although the altitude was still 5,000 feet, the flora was quite unlike that of any region in which we had previously collected, and that undoubtedly accounted for the difference of fauna. We were on the very edge of the tropical belt which stretches along the Tonking and Burma frontiers in the extreme south and west of the province.

DEPARTURE FOR MÊNG-TING

It was already mid-February and if we were to work in the fever-stricken valleys below 2,000 feet, it was high time we were on the way southward. The information which we had obtained near Chên-kang had been supplemented by the natives of Mu-chêng, and we decided to go to Mêng-ting as soon as possible.

The first march was long and uneventful, but, from the summit of a high ridge, we could see a wide valley, which we reached in the early morning of the second day. The narrow mountain trail abruptly left us on a jutting promontory and wandered uncertainly down a steep ravine to lose itself in a veritable forest of tree ferns and sword grass. The slanting rays of the sun drew long golden paths into the mysterious depths of the mist-filled valley. To the right a giant sentinel peak of granite rose gaunt and naked from out the enveloping sea of green which swelled away to the left in huge ascending billows.

We rested in our saddles until the faint tinkle of the bell on the leading mule announced the approach of the caravan, and then picked our way slowly down the steep trail between walls of tangled vegetation. In an hour we were breathing the moist, warm air of the tropics and riding across a wide valley as level as a floor. The long stretches of rank grass, far higher than our heads, were broken by groves of feathery bamboos, banana palms, and splendid trees interlaced with thorny vines.

A SHAN VILLAGE

Near the base of the mountain a village nestled into the grass. The bamboo houses, sheltered by trees and bushes, were roofed with thatch in the shape of an overturned boat, and the single street was wide and clean. Could this really be China? Verily, it was a different China from what we had known before. It might be Burma, India, Java, but never China!

It was the first Shan village we had ever seen, and regretfully we rode away across the plain between the walls of waving grass toward the Nam-ting River. Two canoes, each dug out of a single log and tightly bound together, formed the ferry, but the packs were soon across the muddy stream, and the mules were made to swim to the other bank. Shortly after leaving the ferry we emerged from the vast stretches of rank grass on to the open rice paddys which stretched away in a gently undulating plain from the river to the mountains.



FIG. 3.



FIG. 4.

FIG. 3—The Shan village of Nam-hu near the Nam-ting River. The thatched roofs are characteristic of Shan houses. (See, in comparison, the tile roofs of the Chinese town of Teng-yueh, Fig. 4.)

FIG. 4—A street in Teng-yueh, seen from the wall above the main gate.

MÊNG-TING MARKET DAY

Away in the distance we saw a wooded knoll, with a few wisps of smoke curling above its summit, but not until we were well-nigh there did we realize that its beautiful trees sheltered the thatched roofs of Mêng-ting. But this was only the "residential section" of the village, and below the knoll on the opposite side of a shallow stream lay the shops and market.

The day following our arrival in Mêng-ting the weekly market was held, and, when Wu and I crossed the little stream to the business part of the village, we found ourselves in the midst of the most picturesque crowd of natives it has ever been my fortune to see. It was a group flashing with color, and every individual was a study for an artist. There were blue-clad Chinese, Shans with tattooed legs and turbans pink or white; Burmans dressed in brilliant purple or green; Las, yellow-skinned Lisos, flat-faced Palungs, Was, and Kachins in black and red strung about with beads or shells. Long swords hung from the shoulders of those who did not carry a spear or gun, and hilts of wicked-looking daggers peeped from beneath their sashes. Every man carried a weapon ready for instant use.



FIG. 5—A Burmese girl at the market at Mêng-ting.

Nine tribes were present in the market that day and almost as many languages were being spoken. Amid the babel of sounds half the trading had to be done by signs. The narrow street was choked with goods of every kind spread out upon the ground: fruit, rice, cloth, nails, knives, swords, hats, sandals, skins, horns, baskets, mats, cross-bows, arrows, pottery, tea, opium, and scores of other articles for food or household use. Dozens of natives were arriving and departing, bringing new goods or packing up their purchases; under open, thatched pavilions were silent groups of men gambling with cash or silver; and in the tea houses white-faced natives lay stretched upon the couches rolling pills of opium and oblivious to the constant stream of passers-by. It was a picturesque, ever changing group, a kaleidoscopic mass of life and color, where Chinese from civilized Canton drank and gambled and smoked with wild natives from the hills or from the depths of the jungle.

THE OPIUM TRADE

The permanent population of Mêng-ting is entirely Shan, but during the winter a good many Cantonese Chinamen come to gamble and buy opium. The drug is smuggled across the border very easily, and a lucrative trade is carried on. It can be purchased for seventy-five cents (Mexican)

an ounce in Burma and sold for two dollars (Mexican) an ounce in Yün-nan fu and for ten dollars in Shanghai.

There is no doubt that the Chinese government has been, and is, genuinely anxious to suppress the use of opium and has succeeded to a remarkable degree. We heard of only one instance of poppy-growing in Yün-nan and often met officials, accompanied by a guard of soldiers, on inspection trips. Indeed, while we were in Mêng-ting the district mandarin arrived. We were sitting in our tents when the musical notes of deep-toned gongs floated in through the mist. They were like cathedral bells far off at first, then nearer and louder but losing none of their sweetness. Soon a long line of soldiers appeared and passed the camp bearing in their midst a covered chair. The mandarin established himself in a spacious temple on the opposite side of the village, where I visited him the following day and found him to be an educated and agreeable man.

IN THE JUNGLE OF THE NAM-TING VALLEY

Every morning the valley at Mêng-ting was filled with a thick, white mist, and when we broke camp at daylight on our way to a hunting place a few miles down the river, every mule was swallowed up in the fog as soon as it left the rice field. We followed the sound of the leader's bell, but not until ten o'clock was the entire caravan visible. For thirty *li* the valley is broad and flat as at Mêng-ting and filled with a luxuriant growth of rank grass, but it narrows suddenly where the river has carved its way through a range of hills.

The trail led uncertainly along a steep bank through a dense, tropical jungle. Palms and huge ferns, broad-leaved bananas, and giant trees, laced and interlaced with thorny vines and hanging creepers, formed a living wall of green as impenetrable as though it were a net of steel. We followed the trail all day, sometimes picking our way among the rocks high above the river or padding along in the damp earth almost at the water's edge. At night we camped in a little clearing where some adventurous native had fought the jungle and been defeated; his bamboo hut was in ruins, and the fields were overgrown with a tangle of throttling vegetation.

We had seen no mammals, but the birds along the road were fascinating. Brilliant green parrots screamed in the tree tops; and tiny sunbirds, dressed in garments of red and gold and purple, flashed across the trail like living jewels. Once we heard a strange whir and saw a huge hornbill flapping heavily across the river, every beat of his stiff wing feathers sounding like



FIG. 6—Shan woman at the Mêng-ting market.

the motor of an airplane. Bamboo partridges called from the bushes, and dozens of unfamiliar bird notes filled the air.

CAMP AT NAM-HU

At eleven o'clock on the following morning we passed two thatched huts in a little clearing beside the trail, and the guide remarked that our camping place was not far away. We reached it shortly and were delighted. Two enormous trees, like great umbrellas, spread cool, dark shade above a sparkling stream on the edge of an abandoned rice field. From a patch of ground as level as a floor, where our tents were pitched, we could look across the brown rice dikes to the enclosing walls of a jungle and up to the green mountain beyond. A half mile farther down the trail, but hidden away in the jungle, lay a picturesque Shan village of a dozen huts called Nam-hu, where the guide said we should be able to find hunters.

THE PUZZLE OF MA-LI-LING

The camp at Nam-hu was a supremely happy one, and we left on March 7 with much regret. Its resources seemed to be almost exhausted, and one of our hunters assured us that at a village called Ma-li-ling we should find excellent shooting. We asked him the distance and he replied, "About a long bamboo joint away." It required three days to get there!

Whether the man had ever been to Ma-li-ling we do not know, but we eventually found it to be a tiny village built into the side of a hill in an absolutely barren country where there was not a vestige of cover. Our journey there was not uneventful. We left Nam-hu with high hopes, which were somewhat dampened after a day's unsuccessful hunting at the spot where our caravan crossed the Nam-ting River.

With a Shan guide we traveled due north along a good trail which led through dense jungle where there was not a clearing or a sign of life. In the afternoon we noted that the trail bore strongly to the west and ascended rapidly. Soon we had left the jungle and emerged into an absolutely treeless valley between high barren hills. We knew that the Burma frontier could not be far away, and in a few moments we passed a large square boundary stone; a hundred yards on the other side the hills were covered with bright green stalks, and here and there a field glistened with white poppy blossoms. The guide insisted that we were on the direct road to Ma-li-ling, which he now said for the first time was in Burma. On our map it was marked well over the border in Chinese territory, and we were greatly puzzled.

About six o'clock the brown huts of a village were silhouetted against the sky on a tiny knoll in the midst of a grove of beautiful trees, and we camped at the edge of a water hole. The pool was almost liquid mud, but we were told that it was the only water supply of the village and its cattle. As though to prove the statement a dozen buffaloes ambled slowly down

the hill, and stood half submerged in the brown liquid, placidly chewing their euds; meanwhile blue-clad Shan women with buckets in their hands were constantly arriving at the pond for their evening supply of water. We had no filter, and it was nauseating to think of drinking the filthy liquid. There was no alternative, however, and after repeated boiling and several strainings we settled it with alum and disguised its taste with tea and soup.

After dinner we questioned the few natives who spoke Chinese, but we became only more and more confused. They knew of no such place as Ma-li-ling, and our Shan guide had discreetly disappeared. But they were familiar with the trail to Ma-li-pa, a village farther west in Burma, and, moreover, they said that two hundred foreign soldiers were stationed there. We were quite certain that they must be native Indian troops but thought that a white officer might perhaps be in command.

MA-LI-PA

We reached Ma-li-pa about one o'clock in the afternoon and found it to be a straggling village built on two sides of a deep ravine and having a mixed population of Shans, Chinese, and a few Burmans. It happened to be the weekly market day and the bazaar was crowded.

A number of Indian soldiers in khaki were standing about, and my wife called out to me, "I wonder if any of them speak English." Instantly a little fellow approached, with cap in hand, and said, "Yes, Madam, I speak English."

One cannot imagine how strange it seemed to hear our own language from a native in this out-of-the-way spot! He was the compounder, or medical assistant, and told us that the hundred native troops were in charge of a white officer whose house was on the opposite side of the river gorge. He guided us to a temple, and, while the mules were being unloaded, in walked a tall, handsome young British officer, who introduced himself as Captain Clive. He was almost speechless with surprise at seeing my wife, for he had not spoken a sentence in English or seen a white person since his arrival at this lonely post five months before.

THE SALWEEN RIVER

We remained with Captain Clive for five days and after a most de-



FIG. 7—A Kachin woman at the Mêng-ting market.

lightful visit traveled almost due north to the Salween River. The country through which we passed was a succession of dry treeless hills, brown and barren and devoid of animal life. On the evening of the third day we reached the Salween at a ferry a few miles from the village of Changlung, where the river begins its great bend to the westward and sweeps across the border from China into Burma.

The river has cut a tremendous gorge for itself through the mountains, and the sides are so precipitous that the trail doubles back upon itself a dozen times before it reaches the river 3,500 feet below. The upper half of the gorge is bare or thinly patched with trees; but in the lower part the grass is long and rank, and a thin dry jungle straggles along the water's edge. The river at this point is about two hundred yards wide, but narrows to half that distance below the ferry and flows in a series of rapids between rocky shores.

LIFE IN THE VALLEY

The valley is devoid of human life except for three boatmen who tend the ferry, but the deserted rice fields along a narrow shelf showed evidence of former cultivation. On the slopes far up the side of the canyon is a Miao village, a tribe which we had not seen before. Probably the valley is too unhealthy for any natives to live close to the water's edge; even at the time of our visit in early March the heated air was laden with malaria.

The valley was too dry to be a very productive trapping ground for either small or large mammals; but the birds were interesting, and we secured a good many species new to our collection. Jungle fowl were abundant and pigeons exceedingly so, but we saw no ducks along the river and only two cormorants.

Very few natives crossed at the ferry during our stay, for it is a long way from the main road, and the climb out of the gorge is too formidable to be undertaken if the Salween can possibly be crossed higher up where the valley is wide and shallow. While we were camped at the river the heat was most uncomfortable during the middle of the day and was but little mitigated by the wind which blew continually. During mid-summer the valley at this point must be a veritable furnace and doubtless reeks with fever. We slept under nets at night, and in the early evening while we were watching for peacocks the mosquitoes were very troublesome.

JOURNEYING UP TO LUNG-LING

It is a long hard climb out of the Salween valley. We left on March 24 and all day crawled up the steep sides on a trail which doubled back and forth upon itself like an endless letter S. From our camp at night the river was just visible as a thin green line several thousand feet below, and, for the first time in days, we needed a charcoal fire in our tents.

We were *en route* to Lung-ling, a town of considerable size, where there

was a possibility that mail might be awaiting us in care of the mandarin. Although ordinarily a three days' journey, it was more than four days before we arrived, because I had a sharp attack of malaria shortly after leaving the Salween River and we had to travel half stages.

When we were well out of the valley and at an altitude of 5,000 feet, we arrived at a Chinese town. Its dark ill-smelling houses jammed together in a crowded mass, and the filthy streets, swarming with ragged children and foot-bound women, were in unpleasant contrast to the charming little Shan villages which we had seen in the low country. The inhabitants themselves appeared to no better advantage when compared with their Shan neighbors, for their stares and insolent curiosity were almost unbearable.

The region between the Salween River at Changlung and Lung-ling is as uninteresting to the zoölogist as it could possibly be, for the hills are dry and bare and devoid of animal life. Lung-ling is a typical Chinese town except that the streets are wide and it is not as dirty as usual.

TÊNG-YUEH

It is only three days travel from Têng-yueh and, after two weeks of hunting in a heavily forested mountain pass 8,000 feet high, we decided to go into the city. Têng-yueh is one of the most important places in the province, for it stands as the door to India. All the trade between Burma and Yün-nan flows back and forth through the gates of Têng-yueh, over the great caravan road to Bhamo on the upper Irrawady River. A part of the Chinese Foreign Customs is situated at Têng-yueh, and four white men are employed in its administration; there is also a British consul and a resident missionary, so that when we arrived we seemed to have suddenly dropped into civilization. For a month we hunted very successfully in the vicinity of Têng-yueh and returned there on May 24, ending the active field work of the expedition just a year after it had begun.

PACKING THE SPECIMENS

It was of paramount importance to pack our specimens before the beginning of the summer rains. They might be expected to break in full violence any day after June 1; after they had really begun it would be impossible to get our boxes to Bhamo, for virtually all caravan travel ceases during the wet season.

Our days in Têng-yueh were busy ones, for after the specimens were packed and the boxes sealed it was necessary to wrap them in waterproof covers; moreover, the equipment had to be sorted and sold or discarded, a caravan engaged, and nearly a thousand feet of motion-picture film developed. The entire collections of the expedition were packed in forty-one cases and included 2,100 mammals, 800 birds, 200 reptiles and batrachians, 200 skeletons and formalin preparations for anatomical study, 150 Paget natural color plates, and 10,000 feet of motion-picture film.

Since the expedition was organized primarily for the study of the mammalian fauna and its distribution, our efforts were directed very largely toward this branch of science, and other things were gathered only when conditions were especially favorable. Our tents were pitched in 108 different spots from 15,000 feet to 1,400 feet above sea level; because of this range in altitudes, the fauna represented by our specimens is remarkably varied.

Fortunately all the cases arrived in New York in safety. Even at this time it is impossible to say exactly what there is in our collection, for it is still being prepared for study; it is certain, however, to contain many species new to science.

PORTUGAL: THE COUNTRY AND THE PEOPLE

By WILLIAM THOMPSON

Portugal, "Mother of Navigators," a land glorified by nature as have been few countries of the world, is one of the least known countries of Europe; yet it is a country of many attractions both for the scientific traveler and the layman. For the archeologist, for instance, the buried Roman and Celt-Iberian cities, treasure houses of antiquity, are rich mines for conquest with pick and shovel, awaiting exploration. Nor are there less resources awaiting the too infrequent tourist seeking health or pleasure. "If a large number of English, French, and German works on the health resorts of Europe or of the world, published during the last fifty years, be consulted, it will be seen at once how, if Madeira be excluded, almost all of them make no mention of any resort in Portugal," says Dr. Dalgado in the preface to his useful work on the climate of Portugal.¹

Portugal deepens one's love of nature, for she is vigorous here. Rose and lily, almond and camellia grow in lush profusion. Here, in a land of almost eternal sunshine, amid gardens of laurel and acacia, gray castles and white challenge the passerby. Fountains throw white mists from terraces and grotto; ferns and palms bow to distant slopes whose yield inebriates the bibber in far-distant lands. Long-horned beasts plod with their casked burdens down gentle roadways and along the hilly ranges by the banks of the Douro, far-famed in story and song.

Nor has justice been done to the country's people: we have been too apt to think of the Portuguese as "a political schemer, with a pistol in one pocket and a bomb in another." When I embarked at Amsterdam *en route* to Lisbon, I had grave doubts as to my safety, personal as well as material, considering a visit to this young republic as a precarious adventure rather than an outing, and as not unmixed with possibilities of revolution, bandits, and uncomfortable hotel service; but to my surprise, I found all classes of people the most lovable and trustworthy of the Latin races. Revolutions were incubated in the sanctums of the foreign press correspondents, and bandits were unknown.

The Country

PRODUCTIONS

Portugal is primarily an agricultural country. According to figures for 1912² 78.5 per cent of the surface is productive. Of this 33.4 per cent is under the plough, 11.1 per cent under arborescent cultivation (tree and

¹ D. G. Dalgado: *The Climate of Portugal and Notes on Its Health Resorts*, Lisbon, 1914; reference on p. ix.

² *Annuaire International de Statistique Agricole*, 1913 et 1914, Rome, pp. 13-15.

shrub crops), 28 per cent is forest and woodland, 27.5 per cent is pasture. The proportion of arborescent cultivation is much higher than in any other European country. The crop tree that gives rise to Portugal's most distinctive industry is the cork oak.³ Cork, raw and manufactured, stands second in the list of Portugal's exports.

First in value comes wine. The climate is particularly adapted to the culture of the grape, being humid and very warm. It has a variation of but twenty degrees in winter and summer in the vicinity of Oporto and Lisbon. The rainfall has been as high as 192 inches in twelve months, but it is equally distributed during the year and does not come in torrents.

THE WINE INDUSTRY

The wine industry dates from 1703. Port wine is the product of a certain demarcated district within sixty miles of Oporto, which in 997 was won back by Bermudo II, King of Galicia, from the Mohammedans. No wine produced outside this district can be sold or exported as port wine.

The vines are grown on the slopes of the mountains within this region and are planted on terraces the soil of which is supported by stone walls. Properties devoted to the wine industry (*quintas*) are located at Pinhão, Tua, and Senhora da Ribeira near Vesuvio.

The grape is gathered usually at the end of September or the beginning of October, according to the state of maturity. The bunches are cut from the vine by women and, after all the unsound grapes are removed, are placed in large tin-lined baskets to be carried on the backs of men to the *lagars*. Once the *laga*r is full the process of wine making is begun, the wine being allowed to ferment until the right degree of sweetness is obtained; after which it is drawn off in large vats, and then additions of wine brandy are made in order to stop further fermentation and so retain the required degree of sweetness. The wine is then left until the cold weather has made it "fall bright," before being sent to the lodges or wine stores at Oporto. There it is emptied into a large tank, from which it is pumped into oak vats to be left to mature.

These vats hold sometimes as much as 244 pipes, equal to 1,500,000 dock glasses. (Great care must be exercised that every container is clean. Various yields are blended only after exhaustive tastings. In years when the wine is of exceptional quality the product is kept separate and is shipped as "vintage." There have been since 1908 but two "vintages" which merited the distinction of remarkable flavor and bouquet and possessed good keeping qualities.)

The wood used for casks is the finest Russian oak, which, after being stored for a sufficient time to get rid of its greenness, is taken to the wood-cutting house where it is sawed and planed into variously shaped staves as required.

³ See J. Russell Smith: The Oak Tree and Man's Environment, *Geogr. Rev.*, Vol. 1, 1916, pp. 3-19.



FIG. 1.



FIG. 2.

FIG. 1—Port wine *quinta*, River Douro. The oxcart, like many other agricultural appliances in Portugal, is practically identical with the old Roman form.

FIG. 2—Terraces for vine cultivation at Pinhão on the Douro River.

THE ROADS

Agriculture and other industries, especially in the more remote districts, are handicapped by the lack of good transportation either by rail or highway. Bell,⁴ quoting another writer, gives a vivid picture of the roadways: "The state of the roads with ruts and holes in which carts sink has in certain parts given rise to a curious industry—that of rescuing vehicles which have stuck fast. It is exercised by peasants possessing yokes of oxen, who at sunrise, armed with hooks and ropes, lead them to the worst places and then wait patiently for the motor car or other vehicle to sink, and then immediately offer their assistance in return for a few shillings or pence,



FIG. 3—On the road from Portimão to Monchique, province of Algarve. Wagons carrying cork bark. Compare the pictures of cork oaks illustrating the article "The Oak Tree and Man's Environment" by J. Russell Smith, *Geogr. Rev.*, Vol. 1, 1916.

according to the quality of the vehicle and its occupants' Were a first-rate road to prolong to the Portuguese frontier the road of 500 miles from Paris to the Bidassoa, and could the roads in Portugal be compared with those of the Basque provinces (both in France and in Spain), a country so beautiful and with so many famous buildings would be overrun with motor cars."

Much of the commercial transport of Portugal is by way of the rivers Tagus, Donro, and Guadiana, all having their sources in Spain, and is consequently slow and irregular.

THE POPULATION

With an area of 35,500 square miles the republic had, at the census of 1911, a population of a little under 6,000,000. The density of 153 per square mile compares very favorably with that of Spain, about 100 to the square mile. In the north, where the individual holdings are small, the population is densest; in the district of Porto a maximum of 670 per

⁴ A. F. G. Bell: *Portugal of the Portuguese*, New York, 1915; reference on p. 34.

square mile is reached. In the south, in the province of Alemtejo, the density sinks to 45; here the holdings are much greater. During the Roman domination great areas of wheat were cultivated in this section; but today there are vast stretches of waste land, and grain must be imported. In 1913, wheat imported from the United States was valued at over \$2,300,000.

In fifty years the population has increased nearly $33\frac{1}{3}$ per cent. The foreign element has diminished slightly of late, but the chief factor retarding the rate of increase is emigration. Laborers receive a low rate of wages, only 20 to 25 cents a day. The average annual emigration for the years



FIG. 4—Fishing smacks, Lisbon. Sardines form one of Portugal's chief exports: a good deal of the product, however, goes out under the imprint of French packers.

1908-10 was not far short of 40,000, but in 1912 it increased alarmingly. For the whole of Portugal, including colonies but not including clandestine emigration (estimated at 25,000), the official figure is 88,929, of which 77 per cent was from northern Portugal. Most of this emigration is directed toward Brazil, the official figures for that country registering the entry of 76,530 Portuguese in 1912. The disparity between sexes is, then, not surprising; there are now 1,100 women to 1,000 men, the excess of women being larger than that of any other country of Europe. The proportion of aged people is very considerable. Bell's computation⁵ gives 52,783, or nearly 1 per cent of the entire population, as being over 80 years of age. Although sanitary conditions are very bad, vigor of stock and healthfulness of climate make the people's longevity compare most favorably with that of other countries.

ETHNOLOGY

Ethnologically, Portugal is a conglomerate. The people of the northern provinces of Entre Douro and Minho and Tras-os-Montes are of Galician

⁵ A. F. G. Bell: *op. cit.*, p. 26.



FIG. 5.



FIG. 6.

FIG. 5 House of boulders in the Serra da Estrella. The Serra da Estrella is the loftiest range in Portugal (over 6,500 feet). Physically, climatically, and ethnically it forms an important divide between north and south.

FIG. 6—Peasant group in the Serra da Estrella. Sheep and goats are among the chief resources of the mountaineers; from the milk of the latter an excellent cheese is made.

stock. South of the ethnic divide of the Serra da Estrella the population shows marked Arab, Berber, and negro strains. On the southern coast, from Cape St. Vincent to the Spanish frontier, African strain of blood is very apparent—due to the importation of slaves for service in the olive groves and vineyards of Alemtejo and the Algarves. These Portuguese of the lower provinces have also intermarried to some extent with Dutch, French, and English; and in one province with the Frisians. The Jews, after their forced conversion by King Emanuel, intermarried with all races.

ART

Portugal has a distinct national personality in art, music, and literature—each having a unique vigor. It has been said that all Portuguese are singers. On fête days and Sundays the roads abound with gayly costumed peasants carrying mandolas and singing the songs of Portugal, inspired by Camoëns, whose poems have enriched its literature.

In art and architecture famous names are Carlos Reis, Santos Braga, Teixeira Lopez, Colombano, Adelide Lima, Malho, Salgade, and Fernandez. The cathedrals, veritable monuments to the architectural genius of successive generations, vie with the noblest examples of ecclesiastical edifices in Europe. The sandstone so abundant in Portugal lends itself, when quarried, to the sculptor's chisel; nature's chemistry hardens it after the artist has completed his task.

The Cities and Their Historical Associations

In this country, historically so interesting, every city has its tradition with great names of the past.

SOME NORTHERN CITIES

Citania, the Pompeii of Lusitania, holds rare gems for the excavator wishing to learn the secrets of the Celt-Iberian period. Braga is an inspiration to those who are interested in the Arabic occupation of that picturesque town, where, it is believed, St. James laid the foundation stone of the Cathedral. Its walls hold a clock flaunting this egotistic inscription: "Master of the madrigal, I was made in the year one thousand of our Lord."

Vianna do Castello boasts the most valued titles of Europe, and buried behind the town on the hill are the ruins of Britonia, dating from the time of Catania.

At Vizeu the Lusitanian chief Viviato contested with the Romans; and from Aveiro a large fleet sailed for Newfoundland shortly after its discovery.

BUSSACO

Bussaco, "the sacred," sheltered by the mountains of the same name, has known the Roman, Goth, Moor, Pagan, and Christian. In 1094 the

forest and monastery were ceded to the Bishop of Coimbra and have been the shrine of nature lovers for centuries. Here are growing within a walled area of six miles in circumference three thousand specimens of the aristocracy of the botanical world, many of which have been donated by the elect of the Church in the near and remote parts of the earth.

It was here that Wellington saw the defeat of Masséna's forces, and from the monastery of the Carmelites came the holy fathers to nurse the wounded and bury the dead.

Coimbra, the foster mother of the early Castilian and Portuguese kings, and the Cambridge of Portugal, skirts the lazy and poetized waters of the Mondego River. The University, now the only one in Portugal, succeeded to the charter given at Lisbon by Dinaz in 1290. Efforts have been made to remove the departments of law and medicine to Lisbon, but without success.

SOME SOUTHERN CITIES

Byron went to Cintra to write part of "Childe Harold" and found it "the most blessed spot on the habitable globe." Southey thought it "the most delightful village in Europe." Wellington, after the battle of Bussaco, lingered at this holy shrine and, upon departing, said to an old monk who had served him, "I am turning my back on paradise."

LISBON

Tradition holds that Ulysses founded a settlement on the Tagus near Lisbon. The works of Pliny and Ptolemy give distinction to Roman villages near the mouth of the same river. In Lisbon the daughter of a captain in the service of Prince Henry the Navigator married Columbus. The author of "Don Quixote" loved the Portuguese—a rare feeling in a Spaniard—and it was in Lisbon that a noblewoman bore him a daughter devoted to him until his death.

Alfonso Henriques, as a memorial of his victory at Santarem, erected one of the most gigantic monastic piles ever dedicated to a saint.

✓The chapel of the Graça church of Santarem holds the remains of the navigator Cabral, discoverer of Brazil. Believing he had sailed to the other side of the earth, he so announced on his return, but the falsity of his claim was shown by Amerigo Vespucci.

Setubal, the Cetobriga of the Romans, stands, a sun-lit sentinel, at the gate of the River Sado. Pre-historic adventurers came to dig for the wealth of its hills and to capture the fish of its waters. Bold hills look toward the sea, and granite headlands challenge the lords of the gales to combat. Pliny and Ptolemy report the existence, beneath the sea and on the island facing the town, of ruins recording the domination of the Roman Empire; and today the débris and ruins of villas and wells are numerous as evidence of the Roman craftsman's labors.

Evora is set in the bosom of olive orchards, looking from its summit-perched site to vineyards rolling as far as vision can reach. Here the Romans built a heroic monument to the greatness of the empire—the temple of Diana. Within the town limits, and in a palace now standing, Vasco da Gama received from Manuel I, the patron of navigators, his commission to find the secrets of Eastern Empires.

THOMAR

Thomar, the site of which Gualdim Paes selected in 1160 as a palace and fortress for his Knights Templars, stands monarch over the happy valleys, vine and olive-clad. Here in dead centuries walked the metal-costumed knight who was master of the Moors in the mighty conflicts that helped Spain to gain the final mastery over them. ✓ Vieira Guimarães, geographer and historian, has written of Thomar: “Each stone speaks of a lasting feat of navigation; each motif sings a national hymn; each ornamentation chants a Homeric triumph overseas. Here are the skeletons of Indian reefs, waves of the ocean, the well-cut besants of our knights, the bells of the mules, the chains of our barges, ropes tied to grommet and anchor, weeds and flora of discovered seas, rings of cork; the oak, with roots exposed, the figures on the prow and the swollen sails of the ships, the Buckle and Garter of Manuel, the Portuguese Arms, and the Cross, Emblem of Chevaliers. These stones reflect the glorious times when Portugal carried the torch of civilization within the wooden walls of ships.”

THE RUMANIANS IN HUNGARY

By B. C. WALLIS

[With three separate maps, Pls. VIII-X, facing p. 168.]

This is the first of a series of four articles on Hungary* in which it is proposed to present certain facts which must be taken into consideration in determining the general problem of the future of Central Europe and the more specific problem of the future of the "subject races" of the Hungarian monarchy. These facts are the result of an exhaustive analysis of many Hungarian official publications, notably the census volumes and their several supplements. The purpose of the analysis has involved a rearrangement and a reclassification of the published material in order to arrive at the phenomena concerning the separate nationalities, since they are obscured by the official geographical grouping of the statistics. Wherever it has not been possible to arrive at complete totals, the method adopted has been the use of samples chosen at random over as wide a geographical field as possible; for example, the data for the rural communities set out in the tables which follow are usually the results of a selection of as many villages as possible wherein for each group the inhabitants contain at least 95 per cent of the total population as members of one nationality. When these groups of villages had been determined they were retained throughout the investigation, so that the various data refer always to the same samples of the nationalities. Every care has been taken to make the information typical and characteristic of the race, and to insure the accuracy of the results.

THE FOUR MAIN RACIAL DIVISIONS OF HUNGARY

Hungary contained, in 1910, 21,000,000 people, spread over an area of 127,000 square miles; the three states of New York, New Jersey, and Pennsylvania contained at the same date 19,000,000 inhabitants in an area of 100,000 square miles, while the three states of Ohio, Indiana, and Illinois

*The three following articles (The Slavs of Northern Hungary; The Slavs of Southern Hungary; Central Hungary: Magyars and Germans) will each likewise be accompanied by a set of three separate colored maps in 1:2,000,000 representing relief, nationalities, and population density. The four sets of maps divide the kingdom of Hungary along the following geographical co-ordinates: (1) south of 48° N. and east of 21° E.; (2) north of 48° N.; (3) south of 46° N.; (4) west of 21° E. and between 48° and 46° N. The four maps of each category are so engraved that, when all have been published, they can be combined to form a single map covering the whole of Hungary. The method of representation of nationalities and population density here used has been termed the "contour method" because of its use of lines similar in scope to contour lines on relief maps, their chief attribute being gradational representation and the avoidance of abrupt changes. Mr. Wallis is the first to make extended published use of this method; for an exposition see his paper, with type maps, "Distribution of Nationalities in Hungary," *Geogr. Journ.*, Vol. 47, 1916, pp. 177-188; reference on pp. 178-181.—EDIT. NOTE.

had 13,000,000 on an area of 133,000 square miles. Hungary thus occupies an intermediate position between these two groups of states.

TABLE I—DIVISIONS OF HUNGARY ACCORDING TO PREDOMINANT NATIONALITY

INHABITANTS CHIEFLY	AREA IN THOUSANDS OF SQUARE MILES	POPULATION				DENSITY PER SQUARE MILE IN 1910
		1900		1910		
		THOUSANDS	PER CENT	THOUSANDS	PER CENT	
Rumanians.....	38	4,598	24	4,977	24	131
Northern Slavs.....	28	3,859	20	4,105	19	147
Southern Slavs.....	30	4,642	24	4,953	24	165
Magyars.....	31	6,154	32	6,852	33	221
Total.....	127	19,253	100	20,887	100	164

The four divisions of Table I are approximately quarters of the Hungarian kingdom and will be dealt with in successive articles. The present article deals with Rumanian Hungary, which consists of two portions, the first, Transylvania, a well-known division of the country so determined by its history and its geographical character, the second, named here the Rumanian Forelands, which lies to the west of Transylvania and Rumania and includes the eastern Banát, i. e. the county of Krassó-Szörény, and five counties north of the Maros River and west of the Bihar Mountains (Fig. 3).

Rumanian Hungary is roughly equivalent in area to the state of Indiana, but its population of 5,000,000 is almost double that of the American state. There are five municipalities: Kolozsvár, Nagy-Várad, and Arad, each one of which contains about 60,000 inhabitants (cf. Terre Haute, Ind.) in an area of 12,000, 28,000, and 40,000 acres respectively (Terre Haute and St. Louis have 5,000 and 39,000 acres respectively); Szatmár-Némethi, with 35,000 people and 46,000 acres; and Maros-Vásárhely, with 25,000 people and 8,500 acres.

THE POSITION OF THE JEWS IN HUNGARY

It will be well at the outset to establish a standard of comparison with reference to the changes which have occurred among the nationalities of Hungary during recent years, and, for this purpose, it is essential to establish the Jews in their rightful position as a nationality rather than as a religious community. The census returns have, therefore, been recast. For example, the Magyar Jews have been subtracted from the grand total of Magyars, the German Jews from the total of Germans; in the first three census years the numbers of Magyar and German Jews are officially specified; but in the fourth year, 1910, the numbers have been estimated to fit the recorded grand total of Jews. These estimates have been made with considerable care and in great detail, and there is no reason to doubt their approximate accuracy. Subjected to this correction, the nationality changes are recorded in Table II and are shown graphically, in order to indicate the rate of change, in Figure 1, for the whole of Hungary proper, i. e. the monarchy less Croatia-Slavonia, where the people

are almost entirely Serbo-Croats. Croatia-Slavonia will receive fuller discussion in the third article, on the Slavs of southern Hungary.

TABLE II—POPULATION OF HUNGARY PROPER BY NATIONALITIES, 1880-1910
(Population in thousands)

NATIONALITY	1880	PER CENT	1890	PER CENT	1900	PER CENT	1910	PER CENT	PERCENTAGE INCREASE 1910 ON 1880
Magyars.....	5,962	43	6,842	45	7,948	47	9,143	50	53
Germans.....	1,649	12	1,746	12	1,781	11	1,696	9	3
Rumanians....	2,395	18	2,583	17	2,795	17	2,944	16	23
Slovaks.....	1,836	13	1,883	13	1,990	12	1,957	11	7
Serbo-Croats....	632	5	637	4	624	4	643	4	2
Ruthenians.....	343	2	378	2	415	2	454	2	32
Jews.....	625	5	709	5	830	5	910	5	45
Others.....	287	2	356	2	415	2	468	3	63
Hungary proper.....	13,729	100	15,134	100	16,798	100	18,215	100	32

The insertion of the Jews as a race might be regarded as a questionable procedure, but their numbers are subject to such violent fluctuations that it is well to eliminate them from the other nationalities; such a course is of particular importance in relation to the Germans, since many Jews who are recorded as Germans in one census appear to be recorded as Magyars in the succeeding census. At the same time it may be noted that two of the most important factors in determining the continuity of the nationality spirit in Hungary are the churches and the schools, and the Jews occupy a special position in regard to both these factors.

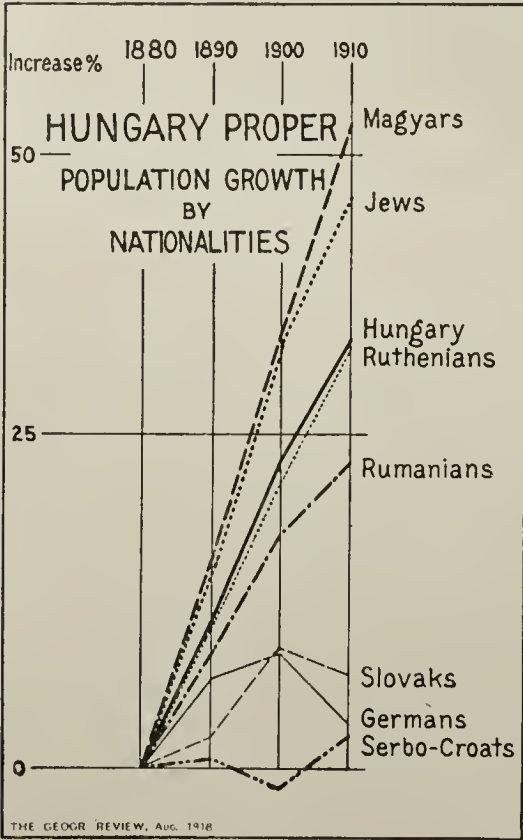


FIG. 1—Diagram showing, by nationalities, the population growth in Hungary proper (exclusive of Croatia-Slavonia) from 1880 to 1910.

POPULATION CHANGES IN
HUNGARY PROPER

Subjected to this correction, it appears that the Magyars have made an increase of 53 per cent in their numbers between 1880 and 1910 and numbered half the population of Hungary proper in the later year. This increase is to be compared with an average increase of but 32 per cent for the whole area. The Jews have remained proportionately steady at about 5 per cent of the popu-

lation and are the only other people who have increased more rapidly than the average. The slope of the lines in Figure 1 indicates that the rate of increase of the Jews was the same as that of the Magyars for two decades but fell away during the last decade. This may imply

that the Jews emigrated more frequently than the Magyars, or that some Jews forswore their religion and their race. The Ruthenians are the smallest nationality, and their increase was steadily the same as the average for Hungary proper. They occupy the hill country in the northeast and are the people farthest removed from the political influences which center at Budapest. The Rumanians come next; their proportion of the whole population has slightly decreased, although there has been a steady but slow increase in their numbers; the rate of increase fell away in the last decade as in the case of the Jews. Slovaks and Germans numbered each about one-eighth of the population in 1880, and their numbers have actually declined during the last census decade. Their rates of change manifest considerable differences and in themselves suggest the working of abnormal influences. The Serbo-Croats in Hungary proper are less numerous than the Jews, and their numbers have slightly increased since 1880.

These facts are here recorded for the purposes of comparison with similar tables and figures for the smaller areas.

POPULATION CHANGES IN RUMANIAN HUNGARY

Details regarding the changes in the population of Rumanian Hungary during the period 1900-1910 are given in Table III.

TABLE III—POPULATION CHANGES IN RUMANIAN HUNGARY, 1900-1910
(Population in thousands)

	TOTAL POPULATION		NET INCREASE (b)-(a)	EXCESS OF BIRTHS OVER DEATHS (d)	CHANGE (c)-(d) (e)	ESTIMATED NET EMI- GRATION (f)	MIGRATION WITHIN AUSTRIA-HUNGARY (e)-(f) (g)
	1900	1910					
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
<i>Transylvania</i>							
Thousands.....	2,477	2,678	201	242	-41	-111	70
Per cent.....	....	....	7.8	9.4	1.6	4.3	2.7
<i>Rumanian Forelands</i>							
Thousands.....	2,121	2,299	178	231	-53	-48	-5
Per cent.....	....	....	8.0	10.4	2.4	2.2	0.2

There are considerable differences in the situation in the two areas. The Rumanian Forelands had a greater natural increase in population and a much smaller rate of emigration than Transylvania; and they lost comparatively few people by internal migration, while Transylvania gained considerable numbers by an inflow of people from other parts of Austria or Hungary. It may be noted here that the values given for emigration from Hungary are based upon detailed official Hungarian statistics and that the final totals for the period 1900-1910 are of necessity estimates because the records fail to show the number of emigrants who returned into Hungary during the first four years of the period. It is probable that the percentage error in these estimated values does not exceed the inevitable error involved in the collection of the facts by the administration officials of the country.

NATIONALITIES IN RUMANIAN HUNGARY

The distribution of the people by nationalities is indicated in Table IV.

TABLE IV—NATIONALITIES IN RUMANIAN HUNGARY, 1880 AND 1910

NATIONALITY	TRANSYLVANIA			RUMANIAN FORELANDS		
	1880	1910	INCREASE PER CENT	1880	1910	INCREASE PER CENT
Population in thousands	2,084	2,678	28	1,705	2,299	34
Density per sq. mile....	92	118	..	110	148	..
Rumanians (thousands)	1,182	1,470	24	903	1,110	23
Percentage.....	57	55	..	53	48	..
Magyars (thousands)...	618	865	40	581	905	55
Percentage.....	29	32	..	34	40	..
Germans (thousands)...	200	218	9	83	99	19
Percentage.....	10	8	..	5	4	..
Jews (thousands).....	29	64	121	64	90	41
Percentage.....	1	2	..	4	4	..

The numbers of Jews in Transylvania underwent a notable increase, and the Magyars and Jews increased more rapidly than the average increase of the population. The rates of change of the three chief nationalities are indicated in Figure 2, where the curves suggest steady changes throughout the period 1880-1910 for Rumanians and Magyars and violent fluctuations for the Germans. Figures 1 and 2 are drawn on the same scale and indicate that the total population of the Rumanian Forelands changed at the same rate as the total population of Hungary proper, while that of Transylvania increased steadily at a slower rate. The Magyars in the Rumanian Forelands, who live close to the Magyars in Magyar-land—as the compact area of Magyar population may be termed (eastern segment on Pl. IX)—increased at the average Magyar rate, but those in Transylvania increased more slowly. The Rumanians in both areas increased at practically the same rate as the total number of Rumanians in Hungary proper. These changes may be summarized as steady and normal. The German changes in the Rumanian Forelands are greater in magnitude but similar in kind to the changes for Germans in general, while the changes among the Germans in Transylvania were slower than the average during the first decade and definitely different, an increase instead of a decrease, during the last decade.

THE GEOGRAPHICAL DISTRIBUTION OF THE RUMANIANS IN GENERAL

The 2,500,000 Rumanians in Rumanian Hungary form half of the population of that area. Elsewhere in Hungary there are roughly another 500,000 Rumanians, who live chiefly in the county of Máramaros, near Máramaros-Sziget (Pl. IX), and in the western Banát. In both these areas the Rumanians are mixed with at least three other nationalities. The Rumanians of Central Europe form a continuous band of people roughly in the shape of the letter D, the vertical stroke representing the Rumanian Forelands and western Transylvania, and the curve running from northern Transylvania through Bukovina, northern Rumania, and Bessarabia round to southern Rumania. The total number of the Rumanians is estimated to

be between 12,000,000 and 13,000,000. Plate IX indicates that the middle of the letter D is inhabited by Magyars in the east of Hungary and a mixture of Magyars and Germans who extend across central Transylvania from Brassó to Kolozsvár. These non-Rumanian islands include 865,000 Magyars, 218,000 Germans, and 64,000 Jews; so that the compact block of about 12,000,000 Rumanians includes an island of 1,000,000 non-Rumanians.

The linguistic boundary to the west of the Rumanians in Hungary lies somewhere in a belt of country which runs northwards from the

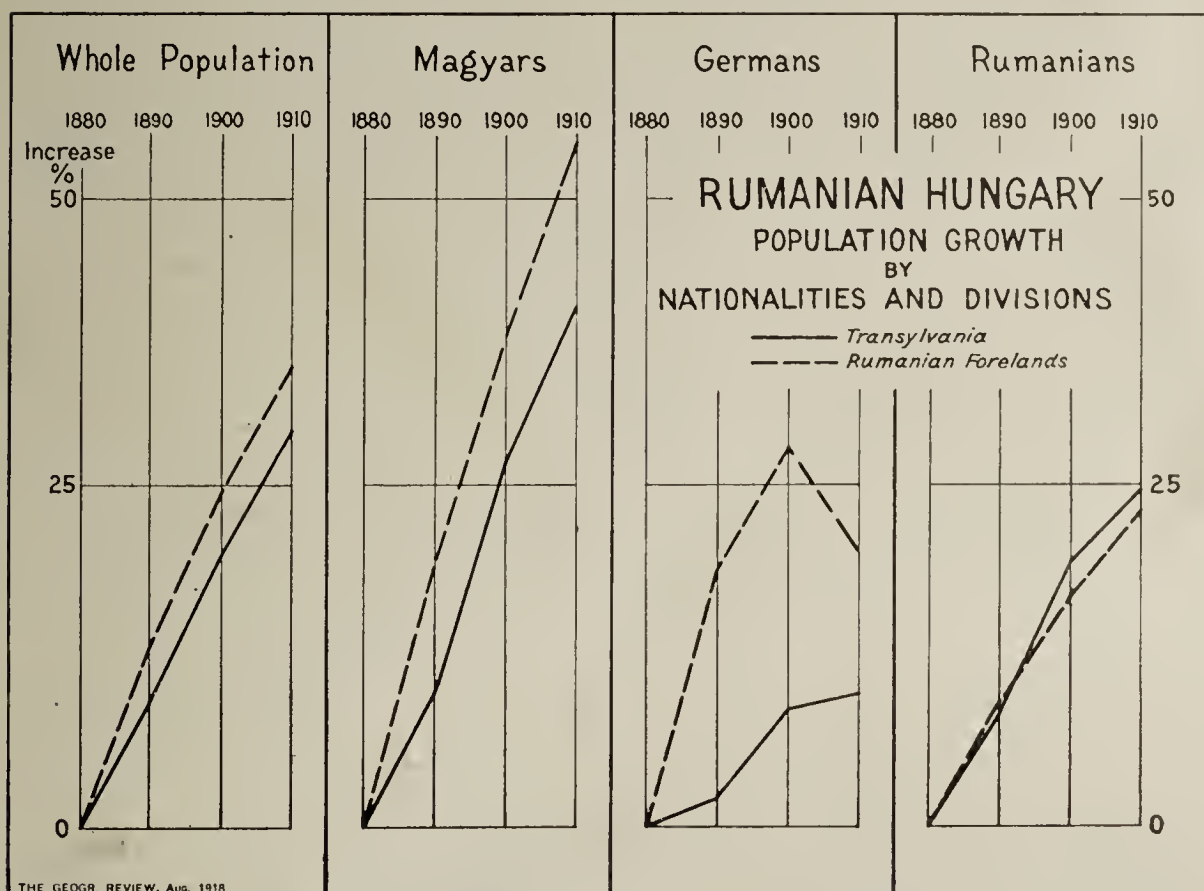


FIG. 2—Diagram showing, by nationalities and divisions, the population growth in Rumanian Hungary from 1880 to 1910.

Danube near Verseez and Arad and bends slightly to the northeast near Máramaros-Sziget. It is approximately indicated by the 50 per cent line for Rumanians in Plate IX. Unfortunately this belt is not marked by any precise physical features and does not coincide at all with the western boundary of Transylvania, which is somewhat well defined by the high ground of the Bihar Mountains (Pl. VIII). It is essential that the relative importance of the masses of land indicated as Magyar and Rumanian in Plate IX should be carefully examined in relation to the distribution of the population as shown in Plate X. The blank spaces in Plate X are in the main elevated land, the Carpathians near the frontier and the Bihar massif in the center (Pl. VIII)¹; there are few inhabitants except in the

¹ In conjunction with Pl. VIII the physiographic map of the Carpathians, *Geogr. Rev.*, Vol. 3, 1917, Pl. IV, should be consulted.—EDIT. NOTE.

basins of the river valleys. Consequently, the large area of land inhabited by over 95-per cent Magyars (Pl. IX) is but sparsely peopled and hence of less importance than the mere area appears to warrant. The Rumanians, usually considered as a typical race of hillmen and herdsmen, inhabit both slopes of the Bihar massif and the southern Carpathians as well as the eastern slopes of the eastern Carpathians. Between Brassó and Kolozsvár, right across the lowest levels of the Transylvanian upland, the peoples are mixed; Germans, Magyars, and Rumanians occupy separate villages in this area; the villages lie stretched along the banks of the rivers, and the hill ridges between the valleys are almost without houses. The western portion of the Rumanian Forelands, beyond the boundary zone, is in the main occupied by the eastern edges of the Magyars of central Hungary; in the south, in the western Banát, Germans, Serbs, Rumanians, and Magyars are mixed.

NATURAL INCREASE OF THE POPULATION

Before comparing the rates of increase of the population in order to estimate the relative value of the population changes it is necessary to estimate the rates of natural increase of the population. The data in the following table are based upon an extensive investigation of the facts for sample villages over the ten-year period 1900-1910.

TABLE V—VITAL STATISTICS, 1900-1910

NATIONALITY	RATES PER 10,000 PER ANNUM			INFANT MORTALITY, PER CENT OF LIVING BIRTHS	ILLEGITIMATE BIRTHS, PER CENT OF TOTAL BIRTHS
	BIRTH	DEATH	NATURAL INCREASE		
Transylvania					
Rumanian.....	350	266	84	20	9
Magyar.....	370	276	94	21	11
German.....	315	221	94	16	10
Rumanian Forelands					
Rumanian.....	279	247	32	17	20
Magyar.....	424	279	145	22	8
German*.....	336	203	133	20	10

* These numbers refer to the whole of the Banát, as there are not sufficient purely German villages in the eastern Banát to provide data strictly comparable with the values for the other nationalities.

The marked low rate of natural increase of the Rumanians in the Forelands may perhaps be a low estimate, yet it agrees with the low rate for the Rumanians in Transylvania. The Germans and Magyars who are enclosed within the Rumanian ring do not increase so rapidly as the Germans and Magyars who inhabit the more productive regions of the Alföld, west of the Rumanians. The infant mortality rates are comparatively high and are related as usual to the birth rate. The Germans have the lowest death rates, and this accounts largely for the high rate of natural increase. The proportion of illegitimate births averages ten per cent, except among the Rumanians of the Forelands, where the rate is double the average. The

rates of natural increase must be collated with the data for internal migration in Table III and the slope of the curves in Figure 2.

The slope of the Transylvanian Magyar line in Figure 2 from 1900 to 1910 is practically the slope which would be given by the Magyar rate of natural increase in Table V. This implies that the total movements of Magyars into and out of Transylvania should roughly balance. The slope of the Transylvanian German line is not equal to that for the Magyars, although the rates of natural increase are equal; consequently, there must have been a loss of Germans by movement out of Transylvania. For similar reasons it may be concluded that there was a net loss of Rumanians from Transylvania. In Table III, it is indicated that there was a net movement of people into Transylvania from other parts of Austria-Hungary; it may be concluded, therefore, that this gain in population is due to an inflow of Jews and Magyars (cf. Table IV). With reference to the Forelands, similar reasoning indicates that the Magyars were steady, the Germans lost as in Transylvania, and the Rumanians gained by internal migrations.

In recent years, therefore, there has been a tendency for the Magyars to move into Transylvania and for the Rumanians to move westwards and downwards into the Forelands.

RELATION OF POPULATION CHANGES TO EMIGRATION

These changes may now be related to the facts for emigration, which are obtained from official publications which are independent of the census, but which can not be obtained for a period preceding 1900, with any degree of usefulness for these purposes. The results of the emigration out of Austria-Hungary are productive of greater changes than those due to internal movements and amount in Transylvania to a loss equivalent to half the natural increase of the population and in the Forelands to rather less than a quarter of that increase. The facts given in Table VI indicate

TABLE VI—ESTIMATED NET EMIGRATION, 1900-1910
(*Figures denote percentage*)

	(A) NATIONALITIES		
	RUMANIANS	MAGYARS	GERMANS
From:			
Transylvania	66	19	14
Rumanian Forelands	33	41	19
	(B) DESTINATIONS		
	To: Germany	Rumania	America
Transylvania	5	43	50
Rumanian Forelands	6	4	81

that the emigrants are not provided evenly by the several nationalities. The Rumanians provide an excess of emigrants from Transylvania and a deficit, proportionally, from the Forelands. The numbers of German emigrants is excessive, especially in the Forelands, and this latter fact is of

particular importance in relation to the actual loss of population indicated by the curve in Figure 2. The proportion of Magyar emigrants from Transylvania is lower than the percentage of the population, but from the Forelands it is normal. It may be noted that it has not been possible to determine how many of the emigrants are Jews, so that some of the Magyar and German emigrants must be Jews.

The excess of emigration from Transylvania in comparison with that from the Forelands is roughly equivalent to the proportion of the Transylvanian emigrants who go to Rumania. Most of these people are Rumanians, although a few of the Magyars in the east move across the frontier into Rumania. Consequently, it may be concluded that the Rumanian tends to leave Transylvania for the lower and more productive lands of central Hungary and of Rumania; this movement is probably largely due to economic causes. On the other hand the Magyar tends to move into Transylvania and to stay there. Since the newer Magyars live in the more fertile parts of Transylvania, part of this movement may be economic in character; but there is also a political movement of Magyars into the country, as the Magyar is a keen bureaucrat and fills the administrative offices throughout the monarchy. The steady decline of the Germans from all causes is noteworthy, and the evidence for decline due to emigration and to a comparatively low rate of natural increase is important since it tends to discount the favorite statement of political controversialists that the Magyars deliberately falsify the statistics in order to reduce the number of Germans and increase the number of Magyars.

EMIGRATION TO AMERICA

The emigration to America is large, chiefly for two reasons; first, probably, because of the difference between social conditions in America and those in Central Europe—a difference which has been aptly summarized by an emigrant in the statement that in America it is not necessary to “kiss the hand” of anyone, and that the wife is styled “Mrs.” and the daughter “Miss”; and, secondly, because of the situation in Hungary with reference to property and rural economic conditions—the land being largely tied up and the peasant forced to be a landless laborer.

INTERNAL MIGRATIONS

A generalized picture of the migratory movements of the people as distinct from their natural increase is provided in Figure 3, where it is indicated that the most restless part of the population consists of the inhabitants of the area where the villages are of many nationalities. The peoples of Hungary are mutually exclusive; each village tends to be the home of one race, and where a village receives a considerable inflow of any kind of “foreigners” the original people tend to migrate. From this unsettled area Rumanians migrate and emigrate, and Germans migrate. The latter

people, known in southern Transylvania as "Saxons," regard all other nationalities with disdain; in a typically German settlement grouped round a church-fortress they will only permit "foreigners" to live in an area appended to the original township, and it is recorded that they persist in the medieval custom of storing provisions in the precincts of the fortress

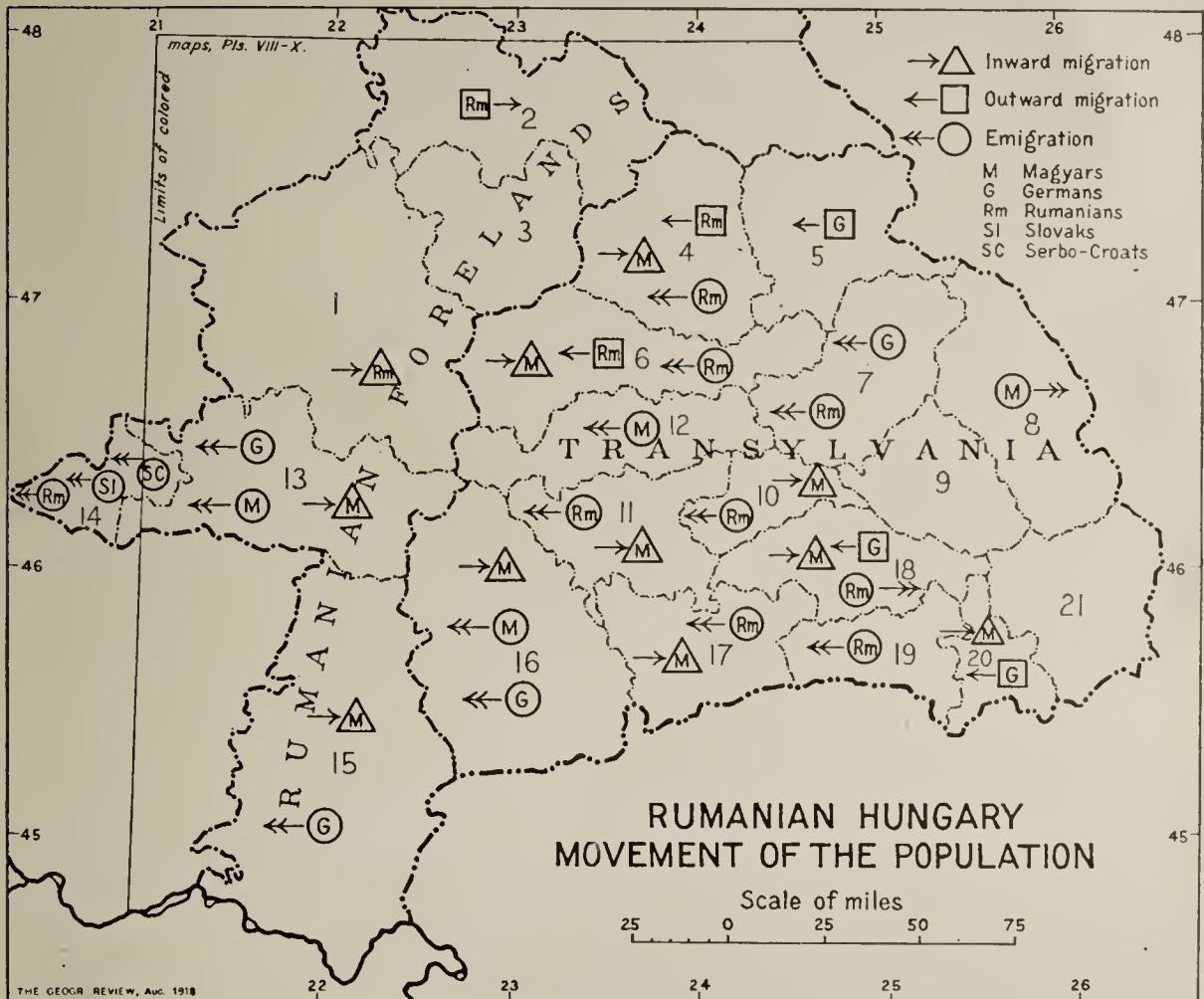


FIG. 3—Cartogram of Rumanian Hungary showing the movement of the population. Scale, 1:5,700,000.

For the names of the counties indicated by hair-line numerals see the key below. The counties are grouped to form two large divisions for the purposes of this article, Transylvania and the Rumanian Forelands. The statistics in the tables and elsewhere in the text relating to these two divisions are based on the constituent counties as here shown.

Key to Counties: 1, Bihar; 2, Szatmár; 3, Szilágy; 4, Szolnok-Doboka; 5, Besztercze-Naszód; 6, Kolozs; 7, Maros-Torda; 8, Csik; 9, Udvarhely; 10, Kis-Küküllő; 11, Alsó-Fehér; 12, Torda-Aranyos; 13, Arad; 14, Csanád; 15, Krassó-Szörény; 16, Hunyad; 17, Szeben; 18, Nagy-Küküllő; 19, Fogaras; 20, Brassó; 21, Haromszék.

as a safeguard should they be attacked by the peoples who inhabit neighboring villages; these stores habitually become rotten, yet they are renewed after each harvest and feed numerous rats.

There are two easy ways into Transylvania; one, in the south, by the water gate of the Maros and the other, in the northwest, in the neighborhood of Kolozsvár across the low elevations between the basins of the Tisza and the Maros (Pl. VIII). Figure 3 shows the inward migration of the Magyars along both these routes. In the southwest corner near Rumania and the Danube lies one of the mining districts of Hungary, partly in Transylvania

and partly in the Banát, and there is an influx of Magyars into both these areas.

RELIGIONS

Table VII indicates the distribution of the peoples among the religious communities.

TABLE VII—RELIGIOUS ADHERENCE
(Percentage of total for each nationality)

NATIONALITY	ROMAN CATHOLIC	CALVINIST	LUTHERAN	UNIATE	GREEK ORTHODOX	JEW	OTHERS
<i>Transylvania</i>							
Rumanian.....	3	2	1	25	67	1	1
Magyar.....	54	25	1	3	4	1	12
German.....	1	2	87	5	5	..	..
<i>Rumanian Forelands</i>							
Rumanian.....	3	1	..	17	76	1	2
Magyar.....	15	70	..	7	..	5	3
German*.....	76	..	8	..	15	..	1

* Whole Banát; see note to Table V.

Speaking generally, the Rumanians belong to one or other of the two Greek religious communities, the Uniate (or Greek Catholic) and the Greek Orthodox churches; the Magyars are Roman Catholics or Calvinists, and the Germans are Roman Catholics in the Banát and Lutherans in Transylvania. The religious separation is not complete, since, for example, some Magyars both in Transylvania and in the Forelands are Uniates. Although religious isolation is not perfect, yet sectarian differences tend to reinforce differences in language in preventing a fusion of the peoples and by stimulating interest in the separate national traditions and customs. Both Roman Catholics and Uniates are under the authority of the Roman Pope, so that the western papacy wields spiritual power over a quarter of the population; rather more than a third come under the authority of the eastern papacy, and most of the remainder are Protestants. Kolozsvár, the capital of Transylvania, is reputed to be, after Budapest, the first center of intellectual and public life in Hungary. It contains a university, a Roman Catholic and a Calvinist college, and is the seat of the Calvinist bishop of Transylvania. The seat of the Roman Catholic bishop of Transylvania is at Gyulaféhervár, near the Maros River.

EDUCATION

The influence of the churches is enormously helped by the schools. In Rumanian Hungary seven schools out of ten are church schools, while in Hungary proper the proportion is three out of four. Rumanian Hungary enjoys a distinctly preferential treatment in regard to the provision of schools. In the first place, the number of State schools is well above the average for Hungary proper, and, secondly, in no other part of Hungary is the proportion of schools where the language of instruction is non-Magyar higher than 32 per cent. The total number of elementary schools

of all kinds is rather higher than the average provision of schools per ten thousand of the population for the whole country. On the other hand, the proportion of children who are not entered upon the school

TABLE VIII—ELEMENTARY EDUCATION, 1910

	PERCENTAGE OF TOTAL NUMBER OF CHILDREN BETWEEN 6 AND 14 NOT ON THE SCHOOL REGISTERS	PERCENTAGE OF THE UNREGISTERED WHO ARE OFFICIALLY EXCUSED FROM SCHOOL ATTENDANCE	PERCENTAGE OF THE SCHOOLS			
			(i) WHICH ARE:		(ii) WHERE THE LANGUAGE OF INSTRUCTION IS:	
			STATE OR COMMUNAL	CHURCH	MAGYAR	NON-MAGYAR
Transylvania.....	20	44	29	71	43	57*
Rumanian Forelands.....	18	29	27	72	57	43†
Magyaria.....	12	21	35	62	99	..
Hungary proper..	12	29	25	74	78	14‡

* 47 per cent Rumanian, 10 per cent German.

† 42 per cent Rumanian, 1 per cent German.

‡ 14 per cent Rumanian, 3 per cent German.

registers is very high, being more than half as large again as the average. This is partly accounted for by the large percentage of children in Transylvania who are awarded official permission to remain away from school on the grounds of ill health, excessive distance between home and school, or inability of the parents to provide the children with suitable clothes for school wear.

UNEQUAL EDUCATIONAL FACILITIES

Under these conditions, the figures given later in Table XI with reference to illiteracy acquire considerable importance. Two-thirds to three-quarters of the Rumanians above the age of six are unable to read and write. This fact forces the conclusion that the education service, which is administered favorably, as has been noted, for Rumanian Hungary as a whole, must be administered unequally among the nationalities, i. e. to the detriment of the Rumanians and the benefit of the Magyars. The Germans look after their own educational system and are the best educated people in Hungary; in fact, they make considerable sacrifices for the education of their children. A successful German hotel keeper who lived in a Rumanian district in which there was no German school arranged for his parents to take over his hostelry while he went to less congenial labors in a somewhat distant town where there was a German school. The German schools are slightly more numerous than the German element in the population justifies.

That the Magyar administration does not provide sufficient educational facilities for the Rumanians can not be excused on the grounds that the Rumanians inhabit a sparsely populated area, for, firstly, a large proportion of the schools are single-teacher schools adapted to rural conditions, and such schools can be easily scattered over a wide and sparsely populated area, as may be seen in the case of the European schools in South Africa; and, secondly, the people do not live on isolated farms but in villages which tend to be strung along the rivers and in valleys where there are roads or

railways and easy transportation; and, thirdly, the Magyar population in the east is almost as sparse as the Rumanian people of the Southern Carpathians (Transylvanian Alps) and the Bihar massif.

PUBLIC HEALTH

A similar inequality of administration is apparent in the public health service. Five out of six Rumanians who die have not received medical treat-

TABLE IX—PUBLIC HEALTH, 1901-1910

	PERCENTAGE OF DEATHS		CAUSES OF DEATH (PERCENTAGE)				NOT CLASSIFIED
	NOT TREATED	NOT CERTIFIED	TUBERCULOUS DISEASES	PNEUMONIA OR PLEURISY	CONGENITAL DEBILITY	SENILE DEBILITY	
	BY A PHYSICIAN						
<i>Transylvania</i>							
Rumanians...	86	84	10	10	20	19	9
Magyars	65	61	13	8	16	18	17
Germans.....	65	65	14	12	18	12	17
<i>Rumanian Forelands</i>							
Rumanians ..	89	88	11	17	25	12	8
Magyars	45	40	15	10	16	11	22
Germans*....	37	34	13	11	11	10	26

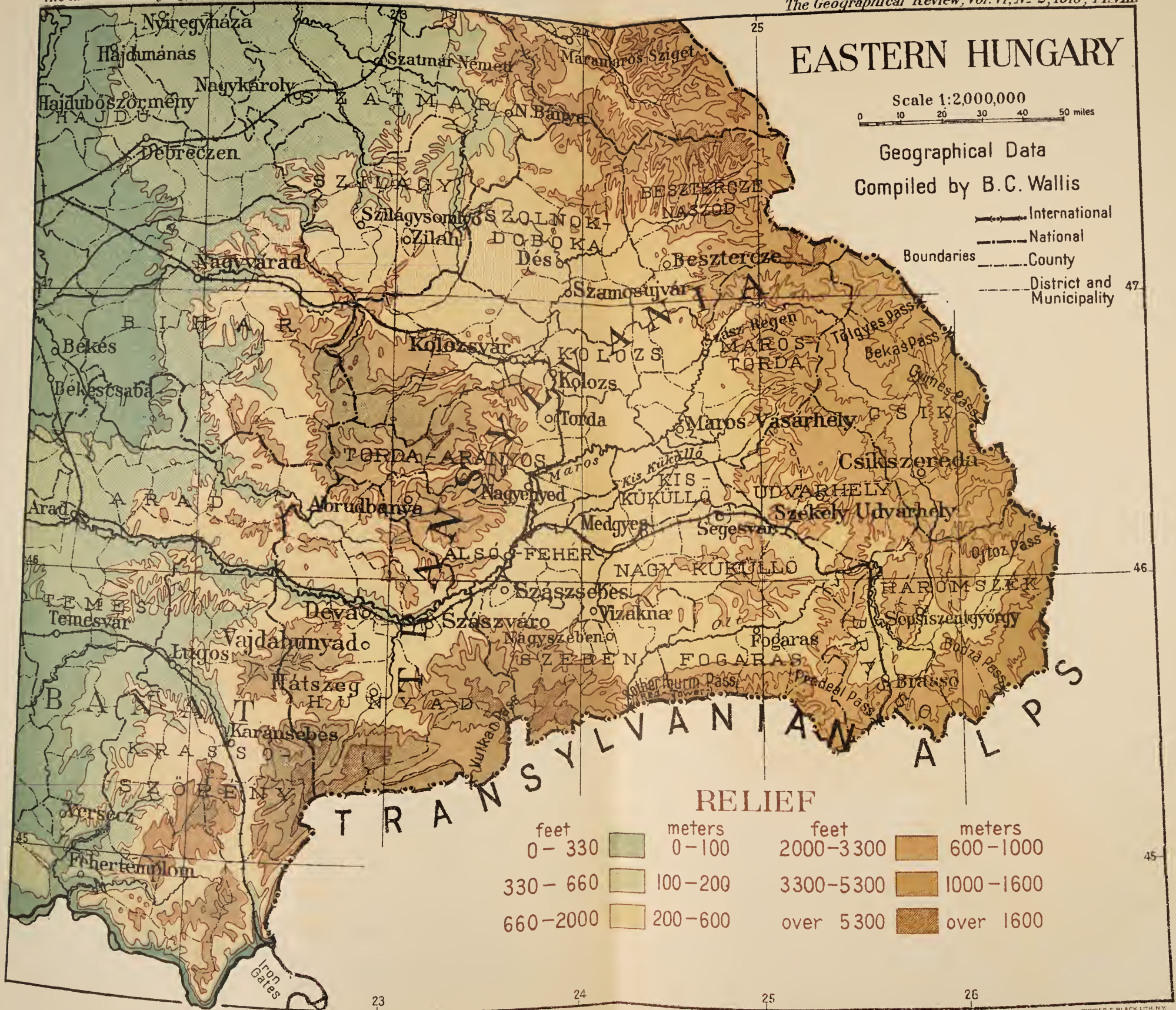
* Whole Banát; see note to Table V.

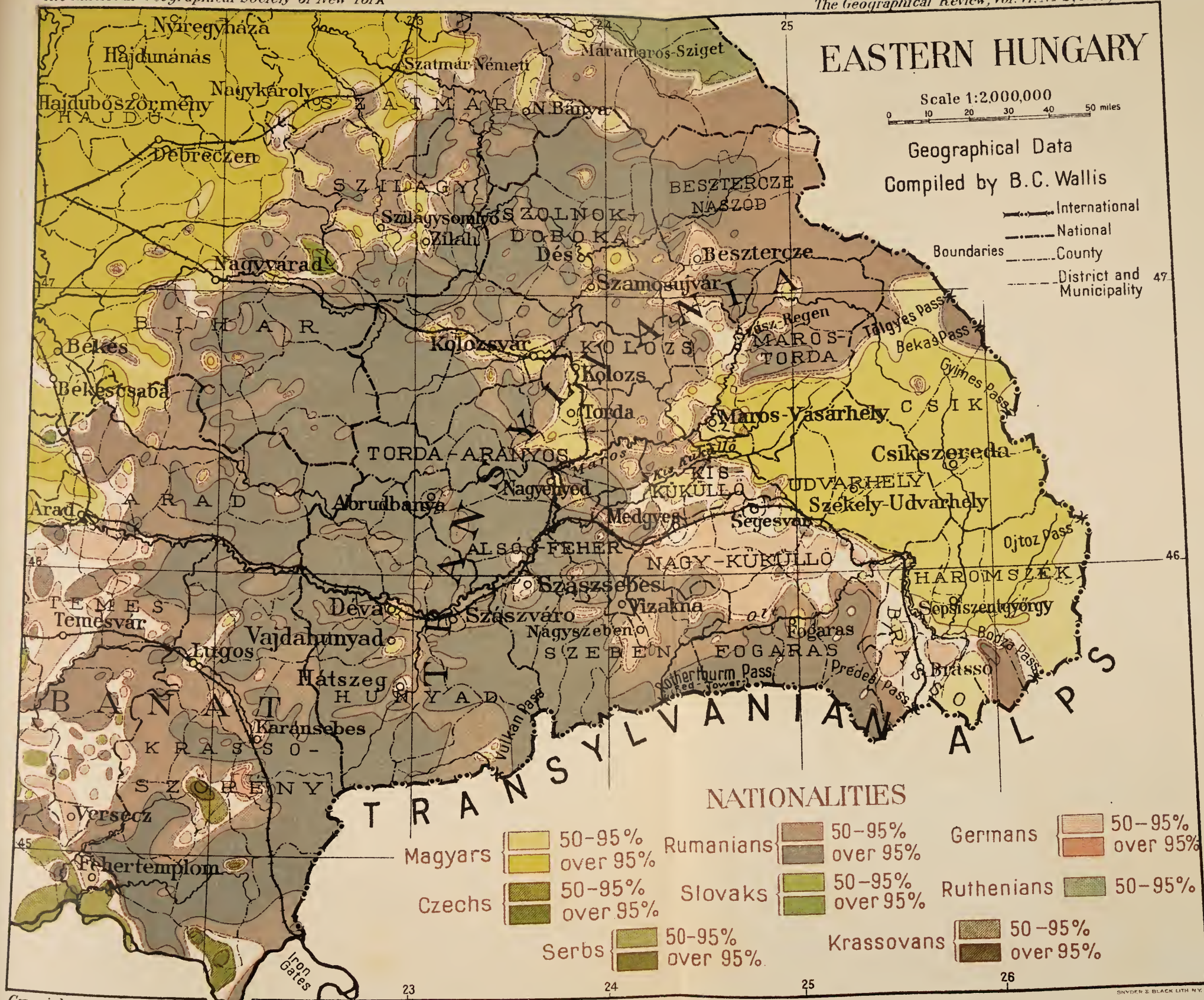
ment, nor is their death certified by a physician. The proportions among Magyars and Germans are not nearly so high. Even after making an allowance for the comparative inaccessibility of the Rumanian villages the disproportion seems unduly great. There do not seem to be enough physicians in Transylvania as a whole, and those who receive appointments in that area seem to serve the Magyars better than the Rumanians. This conclusion is confirmed by an examination of the public health service in comparison with the population (Table X). In comparison with the average for Hungary proper the proportion of public health officers is very small for Rumanian Hungary and is almost appallingly low in comparison with the provision which is made in Magyararia for a purely Magyar population. The Rumanian seems to receive totally inadequate consideration.

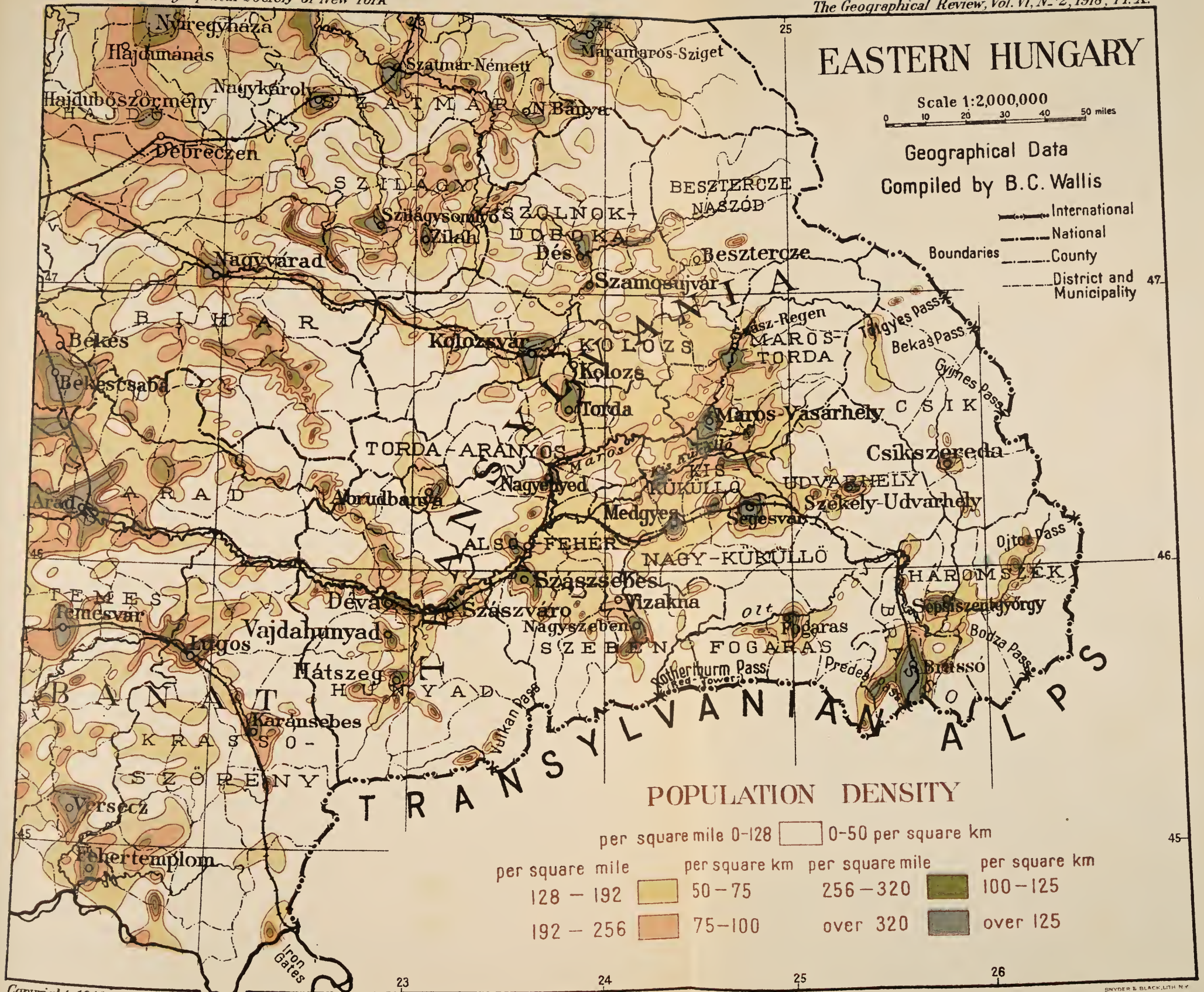
TABLE X—PUBLIC HEALTH SERVICE IN THE DIFFERENT DIVISIONS OF HUNGARY, 1910

DIVISION	NUMBER OF PEOPLE PER:			NUMBER OF FEMALES PER MIDWIFE
	PHYSICIAN	PHARMACY	HOSPITAL BED	
Transylvania	5,200	10,700	570	700
Rumanian Forelands.....	5,500	9,500	840	700
Magyararia.. ..	1,900	7,600	270	540
Hungary proper.....	3,500	8,600	490	700

In consequence of the defective character of the medical service comparatively little reliance can be placed upon the official statements of the causes of death, summarized in Table IX. The Rumanian rates for tuberculosis, pneumonia, etc., in Transylvania bear some relation to the







elevation of the country in which the people live, and the high rate for congenital debility among the Rumanians in the Forelands may be referred to the high birth rate and the high rate of illegitimacy for those people. The differences in the rates for senile debility between Transylvania and the Forelands appear to be related to the smaller numbers of people in the Forelands who are above 60 years of age. The proportion, from one-fifth to one-quarter, of deaths from tuberculosis and pneumonia, appears to be a consequence of the poverty-stricken character of many of the homes.

ECONOMIC CONDITIONS

Certain aspects of the economic conditions in the villages of Rumanian Hungary are presented in Table XI. In general, the appearance of the

TABLE XI—ECONOMIC CONDITIONS
(*Rural Communities*)

NATIONALITY	WOMEN PER 1,000 MEN	AGE GROUPS (PERCENTAGE)				ILLITER- ATES OVER 6 YEARS OF AGE (PER- CENTAGE)	HOUSES (PERCENTAGE)			PEOPLE PER HOUSE	
		0-6	6-14	15-60	OVER 60		STONE OR BRICK	TIMBER	WITH THATCHED ROOFS		
Transylvania											
Rumanian	1,022	15	20	55	10	65	17	79	36	4.4	
Magyar.....	936	16	19	54	11	34	9	89	6	4.1	
German.....	1,012	15	18	56	11	24	61	35	11	4.4	
Rumanian Forelands											
Rumanian	976	18	20	57	5	78	2	85	46	5.2	
Magyar.....	1,023	16	21	55	8	26	2†	12	66	5.2	
German*.	995	15	21	56	9	18	17	1†	28	4.8	

* Whole Banát; see note to Table V.

† Mostly houses of dried clay.

houses in a village is an indication of the nationality of the inhabitants. A German village is tidy and well-kept, with a high proportion of stone or brick houses, well roofed with tiles, slates, or shingles and with a striking absence of thatched roofs. Such a village appears almost as a standing monument of superiority over the houses of any other race. A Rumanian village frequently bespeaks the indigence of the people, the timber houses are badly built, and the roofs of thatch are badly trimmed and unkempt.²

The proportions between males and females tend to confirm the conclusions previously reached regarding the internal migrations of the several peoples, for the males are in excess in those areas where there is an inflow of people of that race. The differences in the percentages in the adult age group, 15 to 60 years, for Magyars and Rumanians in the two areas appear to be related to the greater number of emigrants from Transylvania.

The larger number of people per house is indicative of the larger families and the better economic conditions in the Forelands than in Transylvania.

² For photographs of houses in a typical Rumanian village see Figs. 12 and 13, *Geogr. Rev.*, Vol. 3, 1917, p. 434.—EDIT. NOTE.

RAILWAY TRANSPORTATION

A map of Transylvania which indicates the rivers, the main roads, and the railways serves excellently to show the areas wherein the villages are most numerous, for the areas which are without rivers and roads and which are crossed but rarely by railways are as a rule without villages or houses. Consequently the railway data indicated in Table XII are important.

TABLE XII—RAILWAYS IN THE DIFFERENT DIVISIONS OF HUNGARY

DIVISION	MILEAGE	
	PER 100,000 INHABITANTS	PER 100 SQUARE MILES
Transylvania.....	53	6
Rumanian Forelands.....	65	10
Magyaria.....	50	13
Hungary proper.....	71	10

When the basis of comparison is mileage per number of inhabitants it would appear that Rumanian Hungary is well served by railways, since there are more miles of railway in proportion to the population than in Magyaria. When the basis of comparison is mileage per unit of area, Rumanian Hungary is on the whole below the average. An examination of the railway map itself explains the situation, since the railways of Rumanian Hungary cross the country to communicate with foreign lands or are arranged to facilitate communications between the capital and the outlying Magyar municipalities, which are the seats of Magyar administration. They are not planned to develop the internal resources of the country by a network of branch lines; and it frequently happens that the Rumanian who desires to travel from a village in one valley to another village only a few miles distant yet in a second valley must make a long railway journey down the first valley to a junction and then up the second valley to his destination. The railways therefore are used as a means towards the administrative domination of the Rumanian majority by the bureaucracy of the capital.

SUMMARY

Rumanian Hungary is a land of three nationalities, with three languages used in its schools, and with religious communities of the three main Christian types.

The Rumanians adhere to the Eastern Church, their children are taught in the Rumanian tongue, or not taught at all, and they are the most numerous element. They isolate from the rest of Hungary a million people who occupy the east of Hungary as a result, firstly, of a centuries-old series of settlements and, secondly, of the new migration for political purposes. The historical settlements of the Magyar Szeklers on the eastern frontier of Hungary as a frontier guard is paralleled by the plantations of Saxons made in early times, when Hungary was under German domination, upon lands which had been devastated by the Turks. These Germans still

retain many elements, such as their fortress-churches, which point to their origin as a plantation of foreigners, and they maintain a constant reminder of their mission in their name for Transylvania—Siebenbürgen.

The Magyar names for Transylvania are geographical: Erdély means the forest land, and Királyhagontúl means beyond the Királyhago—a hill which marks the entrance into Transylvania on the route which leads into the district from the northwest. This name is a reminder of the route whereby many of the more recent migrant Magyars enter Transylvania; the rest of the Magyar migrants pass up the valley of the Maros.

The Jews are not relatively so numerous as in other parts of Hungary; they are town-dwellers and are a disturbing element in the nationality statistics from the facility with which they change their official “mother tongue” from German to Magyar.

In the eastern Banát there are two small islands of other peoples (Pl. IX), the Krassovans and the Czechs. Both are Slav peoples. The Krassovans, who are in the main market-gardeners, are claimed as Serbs or Bulgars by different controversialists, but the people themselves assert that they are “just Krassovans,” neither Serb nor Bulgar.

The linguistic boundary to the west of the Rumanians is comparatively sharply defined (Pl. IX), although it does not follow any distinctive physical feature, since it crosses in succession one after another of the left-bank tributaries of the Tisza.

The Rumanian is a peasant, illiterate and condemned to a difficult life in a forested hill country with a harsh winter season which lasts roughly for half the year. His villages are strung lengthwise in the valleys, and there are few people on the ridges to form a connecting link between the people of one valley and those of the next. He tends to migrate to lower levels and is apparently largely indifferent as to the direction of this migration, since he goes to the lower levels of the Transylvania uplands, to the still lower levels west of the Bihar massif, or to the lower plains of Rumania itself.

The general impression that is left from the consideration of the facts is that the Rumanian is neglected, although he is not seriously oppressed.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

An Expedition to the Sierra de Perijá, Venezuela. Under the auspices of the American Geographical Society an exploration of the Sierra de Perijá is being carried out by Mr. Theodoor de Booy of the University of Pennsylvania Museum.

Mr. de Booy left New York in May for Maracaibo. By the middle of the month he had reached La Morqueta, a camp of the Caribbean Petroleum Company in about latitude $10^{\circ} 15' N.$ at the foot of the Sierra. The Sierra de Perijá is the northern portion of that fork of the eastern Andes that dies down in the plains of Guajira. It constitutes the watershed between the César valley and the streams draining to the Gulf of Maracaibo and forms the northern part of the boundary between Colombia and Venezuela. A great part of the Sierra is absolutely unknown. In 1859 the great cartographer of Venezuela, the Italian Codazzi, set out to map this region, but before his work here was begun he died in the little Colombian town of Espiritu Santo; his work was never continued. According to Sievers the densely wooded eastern (Venezuelan) slopes are "still totally unknown" ("Venezuela und die deutschen Interessen," *Angewandte Geogr.*, 1st Series, Part 3, Halle, 1903, p. 10). The Sierra, however, is notorious as the home of a fierce and savage Indian tribe—the Motilones. During the days of Spanish rule missions were established among them. No trace of such remains today, and beyond mutual recriminations there is no contact between settlers and Motilones. On the Colombian side they have caused the abandonment of coffee plantations, while the still existing settlements live in a state of terror. On the Venezuelan side companies prospecting for petroleum west of the Gulf of Maracaibo have found their operations seriously impeded by these savages.

At La Morqueta Mr. de Booy could learn nothing of the Sierra; even the names of peaks were unknown. However, at Machiques, some eight hours' ride to the south (in $9^{\circ} 50' N.$ and Long. $72^{\circ} 25' W.$; thus on Mapa del Estado de Zulia, 1:550,000, by F. Chacín Navas, 1915, one of the best maps of the region) he found Indians (Tucucús) to accompany him in a penetration of the Motilones' country. Two days' ride from Machiques a tribe of these Indians named Macoitas (Macoas) were encountered. Mr. de Booy's comments on this feared and hated tribe are interesting: "I fail to see where these Macoitas live up to their savage reputation: they certainly treat me splendidly and regard my presence as a huge joke. They have built me a house, about 14 feet by 24 feet, and seem delighted to bring me all kinds of food." Mr. de Booy reports the collection of splendid ethnographical material, including photographs.

The need for a survey of the Sierra is confirmed. Mr. de Booy states that Sievers' map (*Karten sur physikalischen Geographie von Venezuela*, *Petermanns Mitt.*, Vol. 42, 1896) is quite erroneous in regard to the eastern slopes of the Sierra; the width of the mountain zone in the latitude ($10^{\circ} 10'$) of the town of Rosario, or Perijá, shown on the Sievers map appears to be much too great. Among the geographical results reported in two of Mr. de Booy's letters, dated June 11 and 21, is the discovery of a series of falls on the headwaters of the Macoita River, a tributary of the Apón, which discharges into the Gulf of Maracaibo. On the right fork of the river are three falls, the uppermost and lowest of which are triple; their heights are about 350 feet, 40 feet, 180 feet. On the left fork is an upper double fall with a height of over 160 feet and a lower fall of 60 feet. At the junction of the forks is another triple fall 170 feet high. The uppermost fall on the right fork descends from an elevation of about 4,000 feet, the adjoining mountain summits having a height of 4,600 feet; the elevation at the junction of the two forks is 2,750 feet. These falls have never before been seen by a white man.

Publication of an Index to the Bulletin of the American Geographical Society, 1852-1915. The Society has just published an "Index to the Bulletin of the American Geographical Society, 1852-1915," by Arthur A. Brooks. The index is a book of the same format as the *Bulletin* of the Society, the predecessor of the *Geographical Review*, and contains xi + 242 pages. It covers the whole series of the Society's periodical publication from its inception in 1852 to the beginning of the present series in 1916, irrespective

of the changes of title it underwent in that period—*Proceedings* and *Journal* being the other names it bore.

An introductory "Historical and Bibliographical Note" calls attention to the great value of the series. During the sixty-four years spanned by its existence "it was the repository of much of the work of importance done in exploration and research in this country; indeed, it is no exaggeration to say that the pages of its fifty-odd volumes contain more geographical material than all other American publications of the time outside of government documents." The fact that no key to this material had been published made it highly desirable to provide one. A table is added showing for each volume the title, volume number and corresponding year, composition, and number of pages. Without such a synopsis it is almost impossible to cope with the bibliographical intricacies of the series, with its frequent change in the form of publication in its early years—a difficulty which is reflected by the fact that the printed catalogue cards of the Library of Congress include a statement quoted from a letter from the Librarian of the Society to explain one feature of its complexity.

The index comprises all articles and papers, entered under both author and topic, together with the record of geographical news and specific entries for all maps and illustrations. Book reviews and titles have not been indexed, and as a rule articles have not been analyzed.

The index is being sent free to all the organizations with which the Society maintains exchange relations. Others can procure copies for \$2.00 each, postpaid.

NORTH AMERICA

The Forest Resources of Texas. Two recent publications by the State Forester of Texas and his associates bring together in compact form the available information regarding the forest resources of the state. Of the broader scope is "General Survey of Texas Woodlands, Including a Study of the Commercial Possibilities of Mesquite," by J. H. Foster, H. B. Krausz, and A. H. Leidigh (*Agric. and Mechan. College of Texas Dept. of Forestry Bull. 3*, 1917). The major part of this survey is devoted to descriptions of the various natural forest regions—the East Texas timber belt, the Edwards Plateau in the central part of the state, the Rio Grande Plain chaparral, and the Rocky Mountain types of the western part of the state. Naturally the East Texas timber belt, which comprises by far the most important body of timber in the state, claims most attention. It will be referred to again below.

Next in importance comes the Edwards Plateau. This region, which within the memory of men still living was primarily grass covered, has been invaded to a remarkable extent by trees and other woody growth as a result of the reduction in the number of grass fires which has accompanied the development of agriculture and grazing. Except in the sheltered and well-watered canyon bottoms there is not sufficient moisture to support dense forests, and the tree growth in general resembles that of a semi-arid region. This is particularly true of the prairie sections, where mesquite is rapidly taking possession of wide areas. In the hills several well-recognized types are found, such as the shinneries (dense, dwarf thickets of shin oak, with live oak and other species in mixture), mountain oak thickets, post oak areas, and cedar brakes. The latter, which are composed of pure stands of mountain cedar, are by far the most valuable. No estimates are available as to either the stand or the output of this species, but the report states that few regions in the United States produce more cedar than the Edwards Plateau and the country to the north of it. Cedar areas are commonly believed to be increasing as a result of cutting, since with adequate fire protection cedar tends not only to maintain itself but to take possession of land cleared of oak and other species.

The three remaining wooded regions are dismissed rather briefly. Live oak occurs both in compact bodies and as scattered trees throughout the central portion of the state from the Rio Grande to Oklahoma. Since this species is essentially an occupant of the coastal plain in other Southern States, its wide distribution in central Texas and its absence from the eastern part of the state are considered quite remarkable. The tree frequently reaches large size but is chiefly of value as a source of fuel and other material for home use. The Rio Grande Plain contains some seventy to eighty species of small trees and shrubs, commonly known as chaparral, none of which occur in the Atlantic type of forest and fully one-fourth of which belong to the bean family. The most interesting feature of this chaparral growth is its remarkable encroachment on the arid plains to the north. In the Trans-Pecos region in the extreme western part of the state, Rocky Mountain species are found at altitudes of over 6,000 feet. Piñon pine is the chief species of the foothills and slopes, and western yellow pine, Douglas fir, and limber pine of the summits and high canyons. Comparatively little information is available as to the abundance and uses of the various trees in this region.

The second publication, "Forest Resources of Eastern Texas," by J. H. Foster, H. B. Krausz, and G. W. Johnson (*Bull. 5* of the same series, 1917), amplifies the information given in the "General Survey of Texas Woodlands" regarding this section of the state. While the latter bulletin contains rather general descriptions of the natural regions into which the belt may be divided—loblolly pine, longleaf pine, shortleaf pine, bottomland, swamp and bayou, and post oak—the former contains more detailed data regarding the forest conditions and forest industries by counties.

It may surprise some to learn that East Texas, in spite of its tremendous output of forest products, is rated by the authors as essentially an agricultural region. Even now, of the forty counties discussed in *Bulletin 5*, approximately 30 per cent is improved agricultural land. Virgin timber amounts to only 14 per cent and second growth to 8 per cent. Culled and cut-over lands exceed 37 per cent, and the remainder of the area consists of pasture, waste, and overflowed lands. Cutting is proceeding rapidly, and it is stated that "there is every reason to hope and expect that large bodies of cut-over lands will be divided into farms and the best of them improved." As a result of this process it is anticipated that in the not distant future large timber tracts will be comparatively rare and that most of the woodland areas of the region will be attached to farms.

S. T. D. DANA

A Remarkable Hailstorm in Nebraska. A hailstorm of unusual severity occurred in southeastern Nebraska on August 8, 1917. The length and width of the area covered, the large amount of damage done to crops and property, the size of the hailstones and the enormous quantities of hail that fell, were all remarkable. Mr. George A. Loveland of the U. S. Weather Bureau at Lincoln, Nebr., made a study of this storm immediately after its occurrence (*Monthly Weather Rev.*, Vol. 45, 1917, pp. 540-542). The length of the storm track was approximately 92 miles; the width varied from 4 to 12 miles. Unfortunately no actual measurements of the sizes of the hailstones were made. The statement "as large as baseballs" was a common one. Drifts of hail three to five feet high were found in protected places. In an orchard near Exeter, Nebr., hailstones and apples (the latter having been knocked off the trees) lay on the ground together and were so nearly of the same size that in a photograph it is difficult to distinguish between them. At one place hail was visible on the ground two days after the storm. Hailstones were blown from one side of houses through to the other side. Barnyard poultry suffered heavy losses. Young pigs and calves were fatally injured. Horses and cattle in pasture were so bruised that they were covered with blood. Fruit trees and crops were seriously damaged.

R. DEC. WARD

EUROPE

Food Production in the British Isles. Truly remarkable among war-time achievements is the agricultural revival in Britain. The zenith of British agriculture as regards gross production was reached some forty or more years ago. In 1872 the arable land of England and Wales amounted to 13,839,000 acres. This figure has never been exceeded. A steady decline had reduced it by 26 per cent at the outbreak of the war (see statistics and graphic representations in A. D. Hall's "Agriculture After the War," Dutton, New York, 1916). Since 1916 the process has been reversed, and it is estimated that a gain of 2,500,000 acres of tilled land has been made in England. Similar estimates place the increases in Scotland at 300,000 acres and Ireland at 1,500,000 acres, making a total for the British Isles certainly not less than 4,000,000 acres. In April of this year an official census for England and Wales returned a great increase in the acreage of all breadstuff crops (according to a report of the Director-General of Food Production, quoted in the *London Times, Weekly Edition*, May 31, 1918). Over the figures for 1916 wheat shows a gain of 39 per cent; the acreage of 2,665,000 is the highest on record since 1882. Oats gained by 35 per cent, the acreage being a record, as is the case with potatoes, where the gain is 50 per cent. If the yield be up to the average—and so far conditions have been favorable—it will be possible to supply the United Kingdom with homegrown breadstuffs for four-fifths of the year. In the year 1916-17 the home production was but one-fifth of the consumption. This calculation is made, of course, on the present scale of consumption and degree of milling and on the use of wheat substitutes for bread.

This great achievement has been carried out under exceptional difficulties of labor shortage. In part it has been rendered possible by the increased use of machinery, in particular of the American motor tractor. The American Consul-General in London estimates that the number of these tractors imported since the beginning of the food campaign of November, 1915, is over 8,000 (*Official Bulletin*, Washington, July 3, 1918, p. 7, quoting from *Commerce Repts.*).

The Mineral Resources of Alsace-Lorraine and Their Significance. For the French people righting of a great wrong will undoubtedly be the sentiment most deeply involved in the restoration of Alsace-Lorraine. But it is not all. Besides the moral consequences there are the economic. As M. De Launay points out, part of the interest of the provinces lies "in their soil and still more in their sub-soil. It lies in the iron ore of Lorraine, the coal of the Saar, the potash and petroleum; in the cotton and woolen industries, in the agricultural products" (L. De Launay: *La valeur économique de l'Alsace-Lorraine*, *La Nature*, May 4, 1918; see also his "France-Allemagne: Problèmes miniers—Munitions—Blocus—Après-Guerre," Colin, Paris, 1917). Dominating the situation is the iron ore of Lorraine (see the map of the mineral resources of Alsace-Lorraine in this number, Pl. VI). Its momentous interest is of recent date. In 1870 neither the ultimate value nor the extent of the deposits was suspected by either French or German metallurgists. Invention of the "basic" process of steel making by the English metallurgist Thomas in 1878 put a new value on the phosphoric ores (see note "The Situation of the Steel Industry in Great Britain," *Geogr. Rev.*, January, 1918, p. 74). Discovery of the extension of the deposits under the Briey plateau accused Teutonic greed of a lack of prescience. On the present value of the field the figures are eloquent. In 1913 German Lorraine produced 21,000,000 tons of ore out of a total of 28,600,000 for all Germany; more than 6,500,000 tons were extracted in Luxemburg; and in French Lorraine 19,500,000 out of a total for Europe of 21,700,000. Altogether the entire basin produced 47,000,000 tons. Leaving aside Luxemburg, the restoration of Alsace-Lorraine will give France mastery of the iron supplies of Europe with a production of 43,000,000 tons. German home production will be reduced to 7,500,000 tons. Here is a potent factor making for peace.

Ore-production alone, however, does not express the highest economic development: export of machinery is more profitable than export of the raw material. Where the value of the Lorraine ore is estimated at three billions of francs, value of the elaborated product is placed at three hundred billions. But if after the war France has the iron, Germany will still have the coal, that is in our day, as De Launay says, the very life-blood of a nation. The pre-war coal requirements of France amounted to 60,000,000 tons, one-third of which was imported. If to the pre-war industries should be added the metallurgical and textile industries of Alsace-Lorraine the requirements would of course be greatly increased. In part the situation might be ameliorated by return to France of the Saar coalfield, a territory lost in 1815 (cf. Pl. VI). The annual production of this coalfield amounts to 17,000,000 tons of a product said to be inferior for reduction to coke and thus for siderurgical purposes. This view, however, has been questioned. Fernand Engerand, describing the basin as "an unknown terrain which may have in reserve happy surprises," says that rather "is it politically that the coal of the Saar is not suitable for siderurgy" (*La politique métallurgique de l'état allemand*, *Le Correspondant*, Vol. 264, 1916, pp. 769-797 and 961-987). It is well known that Imperial policy has concentrated metallurgical industries on the Westphalian coalfield to the detriment of the centers nearer the western frontier.

Next in value of the mineral resources comes the potash of Mülhausen, one of the very few known deposits in the world (see the note "A New Abyssinian Potash Deposit," *Geogr. Rev.*, Vol. 5, 1918, p. 149). Its importance may be gaged from the extent of the deposit "in sight," two billion tons. The amount extracted since the first shafts were sunk in 1911 hardly gives an idea of the possible output, for the German State, the principal proprietor of the Stassfurt mines, till then holding the world monopoly, has not favored the competition of Mülhausen, with its considerable French interests.

Less valuable are the petroleum resources of the Pechelbronn basin north of Strasbourg; nevertheless their annual output of 50,000 tons will be welcome in a country quite deficient in the product. The case of the salt deposits is entirely different. Already French production of salt exceeds consumption and the exterior market is limited; today extraction is limited by syndicate. Addition of the salt mines of German Lorraine would necessitate some delicate adjustments in regard to the industry.

HUMAN GEOGRAPHY

Meteorology and Aviation. Although far removed from the seat of war, Australia has been doing effective and practical work in connection with the application of meteorology to aviation. In less than a month after the declaration of war, instruction in meteorology was begun at the Commonwealth Flying School, at Point Cook, the Honorary Lecturer in Meteorology being Dr. Griffith Taylor. Brief accounts of some

of the flights made in 1915-17 are given by Dr. Taylor and by some of his students in the *Australian Monthly Weather Report and Meteorological Abstract* for July, 1913 (published in 1917). The practical value of the meteorological observations which may be made by an aviator is clearly shown in these essays. During a flight made by Dr. Taylor on March 13, 1917, it was "bumpy" up to 2,500 feet. At 4,400 feet a belt of "low density" air was encountered, perhaps due to the dampness over a number of small lakes and swamps. Here it was impossible for the machine to climb until it was over the ocean, where no difficulty was experienced. Climbing was distinctly better over the sea, but the difference was not apparent above 5,000 or 6,000 feet. "Bumps" are characteristic of the sunny hours, and are due to differences of surface cover and to topography. The alternation of ploughed fields, of grassland, of swamps, even of hard roads, causes very conflicting vertical currents. As soon as the propeller is adjusted to the conditions over one patch of ground, a different surface produces different conditions. Thus constant readjustments are necessary, and "bumps" are unavoidable. These irregularities decrease as the altitude increases. They may extend to a few hundred feet only, or they may reach thousands of feet. On one occasion the obscuration of the sun by a cloud on a warm day was found to produce descending currents over surfaces which had previously been the seat of rising currents. "Bumpiness" was found to be greatest when there are scattered clouds, these producing differences of sunshine and shade, and hence of warming or cooling. There was less disturbance when the sky was perfectly clear or overcast. The good flying conditions associated with inversions of temperature are emphasized. The lower air is then cool, dense, and stable. On one occasion, when there was an absolute calm at the surface until nearly noon, a distinct wave layer was encountered at 800 to 1,000 feet.

Buildings, groves of trees, or similar obstacles produce "bumps," the extent of these irregularities being mainly influenced by the wind velocity. "As obstacles of this character are approached with a following wind, the machine will lift, and drop with equal suddenness on the other side. If approached head to wind, the converse will take place—the machine will probably drop just before reaching the obstacle and rise as it leaves it." The wind, on reaching the obstruction, shoots upwards. The effect extends considerably above the height of the obstacle.

The conditions described in these essays are the common experience of aviators everywhere (consult the papers cited in the note on "Meteorology and Flying" in the *April Review*, Vol. 5, 1918, p. 332). The work in Australia emphasizes clearly the fact that the place and the time to teach aviators the essential meteorological facts is on the flying field and not in the "Ground School." Anyone who has had experience in teaching American aviators the very meager amount of meteorology which the "Ground School" provides for will doubtless agree with this statement.

R. DEC. WARD

GEOGRAPHICAL NEWS

PERSONAL

CAPTAIN ROBERT A. BARTLETT has been awarded the Back Grant of the Royal Geographical Society in recognition of his distinguished leadership after the loss of the *Karluk*, the ship of the Stefansson expedition. The award took place at the Anniversary General Meeting of the Society in London on May 27. The High Commissioner for Canada received the grant on Captain Bartlett's behalf. The grant consists of the interest on a legacy bequeathed by Admiral Sir George Back, the Arctic explorer, on his death in 1878.

DR. G. F. McEWEN of the Scripps Institution for Biological Research read a paper on "A Tentative Plan of Observation for Gaining Detailed Knowledge of the Circulation of the North Pacific" at the semi-centenary of the University of California, March 18-23.

PROFESSOR LAWRENCE MARTIN has been awarded the Prix Conrad Malte-Brun, a gold medal, by the Paris Geographical Society for his studies on the glaciers of Alaska. The award was made at a meeting of the society on May 17; the medal will not be struck until after the war.

DR. T. GRIFFITH TAYLOR of the Commonwealth Meteorological Bureau of Australia has recently been awarded the David Syme Research Prize for 1918 for a thesis based on the correlation of Australian physiography, meteorology, and climatology, with special reference to the control of its settlement and industrial development. This thesis is along the same general lines as his other recent papers, noticed in the *Review* (Jan., 1918, pp. 77 and 86, Feb., 1918, p. 152).

MR. J. B. TYRRELL, for a long time associated with the Geological Survey of Canada, was awarded the Murchison Medal of the Geological Society of London on February 15 in recognition of his many contributions to our knowledge of northern Canada.

MR. WILLIAM B. VAN VALIN of the University of Pennsylvania Museum has been in Alaska for some time as leader of its John Wanamaker Expedition, studying the Eskimos in the Point Barrow region. Phonograph records of Eskimo songs and stories have been made, as well as motion pictures of the native dances and occupations.

OBITUARY

DR. JOSEPH DENIKER, the distinguished French anthropologist, died on March 18 at the age of 66. Dr. Deniker is best known for his work relating to the classification of human races, more especially the races of Europe. His chief work is "The Races of Man" (Contemporary Scientific Series), London, 1900.

DR. G. K. GILBERT, the geologist, one of the senior members of the staff of the U. S. Geological Survey, died at Jackson, Mich., on May 1 in his seventy-fourth year. An appreciation of Dr. Gilbert's work will appear in a later number of the *Review*.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

EUROPE

GENERAL

LYDE, L. W. **Europe v. Middle Europe.** 6 pp. Reprinted from *Sociological Rev.*, May, 1917.

With characteristic directness and force, Professor Lyde, author of several noteworthy publications in European geography, contrasts the core of Europe with its marginal peninsulas. He begins with the principle "that civilization is the collective work of large and small peoples, especially of small peoples near the sea, who always seem to develop powers of outlook, individuality, initiative, and who for that very reason are somewhat refractory material to organize, and of large inland peoples, who always seem to develop powers of organization, discipline, mechanical efficiency, and whose impotence individualistically is perhaps measured by the ease with which they can be organized." The contention is set forth that modern Germany was financed by a mineral base (which led to specialization in armament) in the line of depression that supplied metal, fuel, and transport, and by a chemical base (which became the support of home agriculture) that supplied salt, fuel, and transport. Essen is a representative town of the former class and Barmen of the latter. Professor Lyde says further that if Germany loses the coal, iron, and salt of Lorraine and the coal and zinc of Silesia (her richest iron and her richest coal field) she will cease to be a danger to the peace of Europe as a technical base for efficient mediocrity. In such a scheme there would be room not only for the genius of efficiency of the coreland people but also for the genius of liberty and individualism of small peninsular and island peoples and for "the common spirit of man."

OGG, FREDERIC AUSTIN. **Economic development of modern Europe.** xvi and 657 pp.; bibliogr., index. The Macmillan Co., New York, 1917. Price \$2.50.

In the author's own words the purpose of this book is "to indicate the origins and to explain the nature and effects of a number of the more important economic changes and achievements in Europe during the past three hundred years." As a matter of fact, the book is concerned principally with the nineteenth century and with the United Kingdom, France, and Germany. With these limitations as to time and area, it is evident that the author has the opportunity to develop with considerable fullness many of the topics he discusses.

The book is divided into four parts. Part I, "Antecedents of Nineteenth-Century Growth," takes up about one-fifth of the volume and deals with the agriculture, industry, and commerce of northwestern Europe up to 1815. Part II, "Agriculture, Industry, and Trade since 1815," takes over one-third of the book and gives with considerable fullness the salient facts in the development of northwestern Europe and ends with one chapter on Russia. Part III, "Population and Labor," treats of European emigration, labor legislation, and the organization of labor in Great Britain and Continental countries. Part IV discusses the rise of Socialism and its political consequences, gives one chapter to the German system of social insurance, and a final chapter to the spread of social insurance. At the end of each chapter is a list of selected references on the chief topics discussed.

One welcomes the book especially because it brings together in one volume the story of the economic development of Europe. For the general reader and the student of history, economics, sociology, and commercial geography it cannot but prove to be a most useful and usable book. The widely scattered materials that deal with European economic and commercial history are here gathered into a complete whole, giving not only the facts of Europe's economic growth, but the explanations and results.

To the geographer, the book is in many ways disappointing. Like so many historical works, it does not show a vital recognition of the geographic factor in history. The first chapter in the book, on "Land and People," outlines the physical features of the continent and states some of the broad effects of land and climate on economic life. This chapter with the list of references at the end would lead the reader to expect that the

author understood and intended to apply some of the principles of geographic influences. In the main discussion, however, these geographic facts, so carefully stated in the first chapter, are not mentioned, or, at least, not used in the economic interpretation.

G. B. ROORBACH

PHILIPPSON, ALFRED. **Der französisch-belgische Kriegsschauplatz.** (Die Kriegsschauplätze, herausgegeben von Alfred Hettner, No. 2.) 92 pp.; map, diagrs., bibliogr. Reprinted from *Geogr. Zeitschr.*, Vol. 21, 1915, No. 5, pp. 242-277; No. 6, pp. 321-344. B. G. Teubner, Leipzig and Berlin, 1916. Mk. 1.80. 9 x 6.

The German soldiers in the trenches are supposed to have an interest in the geological and geographic aspects of the theaters of war in which they operate, and Dr. Philippson presents in the brochure before us an account of the geology and physiography of the western front designed to satisfy this interest. After a preliminary survey of the Paris Basin with its concentric *cuestas* and bordering mountain masses, the author gives a more detailed regional description of the various sectors of the western front, beginning at the southeast with the Vosges Mountains and the associated portion of the Rhine *graben*. The striking contrast between the steep eastern scarp of the Vosges block mountain and its more gentle western slope has had an important influence in military strategy. The French armies have had a marked advantage in ascending the gentle west slope to drop down the steep eastern scarp upon the Germans, who in their turn have found it impossible to push the French back up the steeper gradient. In this region the dividing line between the two armies, like the old language divide, and for the same fundamental reason, lies east of the topographic divide.

In discussing Lorraine the author lays emphasis upon the great iron-ore deposits and discusses the various lines of communication which converge upon and add strategic importance to the "Lorraine Gateway" into France. The two parallel belts of the Champagne are known respectively as the Wet Champagne and the Dry Champagne, because the one consists of impervious clay which prevents the ready escape of water from the surface, while the other is underlain by pervious chalk. The course of the Marne River across these two belts receives particular attention. In view of the oft-repeated claim of the German official reports that there was no German defeat on the Marne nor any retreat following the battle named for that river, it is interesting to read in a German publication the author's admission that, after initial victories, overpowering odds forced the three German armies in the Champagne to withdraw to the north and take up defensive positions. The courses of the Marne, Aisne, and other strategic valleys through the plateau of the Isle de France are considered in relation to the advance on Paris in the early days of the war and the natural defenses of the city itself receive some attention. The plain of Picardie, Artois, and Cambresis, with its excellent network of roads and railroads, is described as the natural gateway from the north into the Paris Basin.

A second part of Philippson's essay is devoted to the natural regions of Belgium, in which the fertile plain, with its easy lines of communication, is contrasted with the dissected upland of the Ardennes. Attention is called to the obstacles encountered by the German troops in the shape of numerous canals, especially in the lowest part of the plain, near the coast. Violation of Belgian soil is excused on the specious plea that the Belgian plain was in the natural line of march of the German troops. According to the author, the momentous question as to what the future of Belgium shall be cannot yet be answered!

A geological map of France and Belgium and three geological cross-sections illustrate the paper, which has throughout a strong geological flavor. DOUGLAS W. JOHNSON

TOYNBEE, A. J. **Nationality and the war.** xii and 522 pp.; maps, index. J. M. Dent & Sons, Ltd., London and Toronto, 1915. 7s. 6d. 8 x 5½.

The map facing page 501 (Pl. VII), showing the nationalities of Europe and the Asiatic borders, is the key to and the summary of the book. This map, as well as the other six showing individual "problem areas," is not the work of a geographer—the maps have no scale, no latitude and longitude—but it is an appreciation of geography. Nationality, recognized as the great problem of the war, is defined as a subjective, psychological feeling in living people which may be kindled by the presence of various factors, a common country, common language, common religion, common tradition. Nationality has manifold origins; its study involves many of the fields of human knowledge; it is a matter for the collaboration of experts. The actual solutions offered by Mr. Toynbee, together with the facts and interpretation of facts upon which they are based, need not be criticized here, for they represent the pioneer work of an individual. The chief value of this contribution to reconstruction after the war lies in its early recognition of the nature and vast scope of the problems to be considered at the peace conference and the need of preparation for approaching them.

The map of nationalities indicates one of the fundamental facts in the problem. Vienna approximately marks the dividing point between two regions quite unlike each other from the point of view of nationality. West of Vienna, nationalities are compact and, broadly speaking, are coincident with national states. In western Europe, for the most part the principle of nationality developed or matured during the last century. Where it has failed to mature, there is trouble. "Failure to solve her national problem has arrested Ireland's development since the seventeenth century and imprisoned her in a world of ideas almost unintelligible to an Englishman till he has traveled in the Balkans." The forced growth of German nationalism has involved the inclusion of unwilling subject nationalities in the Empire.

For backward countries far from the national ideal, in the Nearer East for instance, assistance must be rendered by internationalism. Since the Congress of Vienna in 1815 internationalism has existed as an ideal. That it has failed in the past does not prove that it will fail in the future. A warning at the close of the book suggests a means of averting such failure. "The relation between the different elements in a country is continually changing." No settlement can be rigid and permanent; success will lie only as allowance is made for growth and change.

BAILEY, W. F. **The Slavs of the war zone.** xii and 266 pp.; map, ills., index. E. P. Dutton & Co., New York, 1916. \$3.50. 9 x 6. [Among coming problems in Europe is that of the Slav. From Bohemia and eastern Italy to the plains of Russia the various groups have needs and desires. A better knowledge of their demands and of their promising lands will be gathered from these pages. Although carried away at times by his own enthusiasm the author does not sacrifice discrimination to appreciation. His readers will be brought face to face with men of head and heart who richly deserve to be freed from German oppression or influence. The descriptions of lands and peoples show a keen eye for the picturesque.]

BENEŠ, EDOUARD. **La place des Tchécoslovaques parmi les Slaves.** *Scientia*, No. 69-1, Vol. 23, 1918, pp. 48-60. Florence.

BRÜCKNER, ED[UART]. **Hydrographische Ergebnisse der Erforschung der Hochsee der Adria in den Jahren 1911-1912.** *Atti X Congr. Internaz. di Geogr.*, Roma, 1913, pp. 1167-1177. Reale Società Geografica, Rome, 1915.

CEDERBLOM, GERDA. **Huru några spånadsredskap och andra husgeråd vandrat genom Europa.** Ills., bibliogr. *Ymer*, Vol. 36, 1916, No. 1, pp. 15-31. [How certain implements for spinning and other domestic utensils have progressed across Europe.]

CHISHOLM, G. G. **Central Europe as an economic unit.** *Geogr. Teacher*, No. 49, Vol. 9, 1917, Part III, pp. 122-133. [Reflections naturally centering around Naumann's "Mitteleuropa." In particular they are concerned with the future relations of Central Europe to the rest of the world and a possible league of nations. They lead to the suggestion of a need that must be met before the world can advance—"the need for raising all the world if we are permanently to raise any part of it."]

DAY, P. C. **Notes on the climate of France and Belgium.** Maps, diagrs. *Monthly Weather Rev.*, Vol. 45, 1917, No. 10, pp. 487-496.

EVANS, ARTHUR. **New archeological lights on the origins of civilization in Europe.** *Ann. Rept. Smithsonian Inst. for 1916*, pp. 425-445. Washington, D. C., 1917. [Address of the president of the British Association for the Advancement of Science, Newcastle-on-Tyne, 1916.]

FLEURE, H. J. **Regions in human geography—with special reference to Europe.** Bibliogr. *Geogr. Teacher*, No. 47, Vol. 9, 1917, Part I, pp. 31-45. ["Report of a lecture delivered to the Geographical Association at its annual meeting on January 5, 1917."]

GIUFFRIDA-RUGGERI, V. **Antropologia e archeologia in taluni riguardi della preistoria europea.** *Archivio per l'Antropologia e la Etnologia*, Vol. 46, 1916, No. 1-2, pp. 13-41. Soc. Italiana d'Antropologia e Etnologia, Florence.

MACKINDER, H. J. **Some geographical aspects of international reconstruction.** *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 1, pp. 1-11. [Developed on the author's theory of the broad distinction of peoples as coastal and continental. Italian Trieste has a Slavic and German hinterland, Greek Smyrna a Turkish hinterland, German Königsberg a Polish hinterland. Such veneers of a coastal upon a continental population constitute many of the present "problem areas."]

NIEDERLE, LUBOR. **La race slave: Statistique, démographie, anthropologie.** Trans. from the Czech by Louis Leger. xv and 231 pp.; map, bibliogr. Felix Alcan, Paris, 1916. 3 fr. 50. 5 x 7½. [A second edition, containing very few changes on

account of its being impossible for the editors to communicate with the author. A digest in English of this standard work will be found in *Ann. Rept. Smithsonian Inst. for 1910*, Washington, 1911, pp. 599-612.]

PARMENTIER, GEORGES. **Un pays neuf: La Laponie.** Ills. *Atti X Congr. Internaz. di Geogr., Roma, 1913*, pp. 1099-1124. Reale Società Geografica, Rome, 1915.

PAWLOWSKI, STANISLAW. **On Polish geographical names.** Map, bibliogr. Reprinted from *Kosmos*, Vol. 39, 1914, pp. 615-665. Lemberg. [In Polish: résumé in English.]

PILTZ, ERASME. **Petite encyclopédie polonaise.** viii and 478 pp.; map, bibliogr., index. Librairie Payot & Cie., Lausanne and Paris, 1916. 8 x 5½.

POSNER, STANISLAW. **Poland as an independent economic unit.** With an introduction by Sidney Webb. 40 pp.; bibliogr. Polish Information Committee. George Allen & Unwin, Ltd., London, 1916. 6d. 8½ x 5½. [With references to the geographical individuality and the geographical boundaries of Poland.]

RABOT, CHARLES. **La Baltique.** Maps, diagr., ills. *La Nature*, No. 2205, 1916, Jan. 1, pp. 1-6. [Abstracted in the *Geogr. Review*, Vol. 1, 1916, p. 458.]

RICCHIERI, GIUSEPPE. **Le basi geografiche della nazione polacca.** *Boll. Reale Soc. Geogr. Italiana*, Vol. 5, 1916, No. 4, pp. 306-322; No. 5, pp. 385-402. Rome.

RIKLI, M. **Kreta und Sizilien.** 35 pp.; ills. (Vegetationsbilder, Ser. 13, No. 1-2. Herausgegeben von G. Karsten und H. Schenck.) Gustav Fischer, Jena, 1915.

SCHÜTTE, GUDMUND. **Nord- og Mellemevropa efter den rensede Ptolemaios.** Maps, diagrs. *Geografisk Tidsskrift*, Vol. 23, 1916, No. 7, pp. 257-268. Copenhagen.

TARAMELLI, TORQUATO. **La formazione dell' Adriatico.** Maps. *La Geografia*, Vol. 5, 1917, No. 5-6, pp. 172-187. Novara.

TONIOLO, A. R. **Dei limiti polari dell' olivo e del loro valore come indice del limite settentrionale della provincia climatica mediterranea.** *Atti X Congr. Internaz. di Geogr., Roma, 1913*, pp. 1016-1025. Reale Società Geografica, Rome, 1915.

WILSON, RICHARD, edit. **Race and region.** 64 pp.; maps, ills. (Dent's School Pamphlets, Senior, No. 1.) J. M. Dent & Sons, Ltd., London, Paris, & Toronto, [1916]. 5½d. 7 x 5. [A simple and interesting geographical treatment of the races of the world and the nations of Europe. A point is worthy of note: to difference in climate is ascribed the differentiation between the Teutonic and Romance languages. "And as time went on the regions which they had chosen for their homes had a very definite effect upon their language. Those who lived in the warmer lands could open their mouths freely and formed words in which the vowels were open and the consonants clear and distinct. Those who lived in the colder lands were more subject to huskiness and kept their mouths shut as much as possible to keep out the cold; so they formed thick guttural sounds with heavy consonants and close vowels" (p. 17).]

FRANCE

BIGOURDAN, G. **Le climat de la France: Température, pression, vents.** 135 pp.; maps, diagrs. Gauthier-Villars et Cie., Paris, 1916. 9 x 5½.

Interest in the climate of France has been greatly stimulated by the war. Much of the fighting has, from the beginning, taken place on French soil, and the meteorological controls over the military operations in northeastern France and in Belgium have been so marked that they have attracted general attention, even outside the ranks of meteorologists. M. Bigourdan's monograph presents the essential facts concerning the temperature, pressure, and winds of France in a simple and clear-cut way. The study is based on Angot's work, and several of the diagrams are reproduced from Angot's original drawings. Monthly, seasonal, and annual temperature charts, monthly and annual pressure charts, and seasonal wind charts are included. One feature deserves special commendation. Each chart has, below it and apart from the general text, a few lines of descriptive matter in which attention is called to the most important features. This plan makes it possible quickly to familiarize oneself with the essential facts and saves the tedious operation of looking over several pages of text in order to find the discussion of the illustrations. Much of the information is clearly and satisfactorily given by means of diagrams. A useful map is that showing the topography of southern France, in the region of the mistral. The wind charts are especially clear. The one for winter shows the prevailing directions to be between south and west in the north; between north and west in the south; with variable winds in the west and with very well-marked northerly and northwesterly directions (mistral) on the shores of the Mediterranean.

R. DEC. WARD

— **American Industrial Commission to France, September-October, 1916, Report to the American Manufacturers Export Association.** 256 pp.; maps, ill., bibliogr., index. New York, 1916. \$10.00. 11 x 8. [The commission went to France "to ascertain how American resources might best be made available for the reconstruction of the devastated regions, and with a hope of furthering Franco-American trade relations." The report presents a brief survey of industrial France and of various related social conditions in the country. Besides photographs of the devastated areas it is illustrated by maps of agriculture, industry, and transportation, and by several harbor plans—the maps and plans being compiled from the "Atlas général Vidal-La Blache" and from official sources.]

BLANCHARD, RAOUL. **L'industrie de la houille blanche dans les Alpes françaises.** Map, diagrs. *Ann. de Géogr.*, No. 139, Vol. 26, 1917, pp. 15-41.

BLANCHARD, RAOUL. **Régimes hydrauliques et climatiques: Préalpes et Grandes Alpes.** Diagrs. *Recueil des Trav. de l'Inst. de Géogr. Alpine*, Vol. 5, 1917, No. 3, pp. 347-384. Grenoble.

FOLLIASSON, MME. **Mouvement de la population en Maurienne au XIXe siècle.** Maps, diagrs. *Recueil des Trav. de l'Inst. de Géogr. Alpine*, Vol. 4, 1916, No. 1, pp. 1-187. Grenoble. [During the last century the population of Maurienne has increased only very slightly. In regard, however, of the general decline of rural population in France it is surprising that this Alpine valley has not suffered more. The diminution—chiefly by emigration from the mountains—has been counterbalanced by an industrial development in the communities of Lower Maurienne, based largely on the introduction of hydro-electric power. Expanding industry has drawn not only natives but also a good number of Italians.]

FRYER, E. M. **The hill-towns of France.** xv and 260 pp.; ill. E. P. Dutton & Co., New York, 1917. 8½ x 5½.

GADOUD, M. **Les forêts du Haut-Dauphiné à la fin du XVIIe siècle et de nos jours.** *Recueil des Trav. de l'Inst. de Géogr. Alpine*, Vol. 5, 1917, No. 1, pp. 1-113. Grenoble.

GALLOUÉDEC, L. **La Bretagne.** With preface by Maurice Faure. iii and 260 pp.; ill., index. (Histoire et géographie régionale de la France.) Hachette et Cie., Paris, 1917. 3 fr. 50. 8½ x 5½.

GAZAUD, LAURENT. **Note sur le mistral.** Maps. *Bull. Soc. Languedocienne de Géogr.*, Vol. 39, 1916, No. 2, pp. 120-129. Montpellier.

GERMAIN, LOUIS. **L'Étang de Berre, d'après Mr A. Chevallier.** Maps. *Ann. de Géogr.*, No. 143, Vol. 26, 1917, pp. 329-343. [The opening on May 7, 1916, of the Marseilles canal to the Rhone (see note in *Review*, Vol. 1, 1916, p. 459) has brought a measure of life to this neglected backwater of the Mediterranean.]

GLANGEAUD, PH. **Les anciens glaciers du massif volcanique des Monts-Dore. Les trois périodes glaciaires sur le versant nord-ouest du Sancy.** *Comptes Rendus de l'Acad. des Sci. [de Paris]*, Vol. 164, 1917, June 25, pp. 1011-1014.

HARLÉ, ÉDOUARD, AND JACQUES HARLÉ. **Les dunes continentales des landes de Gascogne.** 3 pp. Reprint from *Comptes Rendus de l'Acad. des Sci. [de Paris]*, Vol. 163, 1916, Nov. 6.

HARLÉ, ÉDOUARD, AND JACQUES HARLÉ. **Les dunes maritimes de la côte de Gascogne.** 3 pp. Reprint from *Comptes Rendus de l'Acad. des Sci. [de Paris]*, Vol. 164, 1917, Jan. 2.

IRAGUE, M. **Excursion Géographique Interuniversitaire du 17 au 22 mai 1914.** *Rev. de Géogr. Commerciale*, Vol. 43, 1917, No. 1-2-3, pp. 261-284. Bordeaux. [To Bordeaux and the south of France.]

LANDRY, ADOLPHE. **Notre commerce d'exportation avant, pendant, et après la guerre: Encyclopédie parlementaire des sciences politiques et sociales.** 241 pp. H. Dunod & E. Pinat, Paris, 1916. 4 fr. 50. 8½ x 5½. [Having in mind changed conditions brought about by the war and the prospect of economic readjustments to come, the author outlines in this volume the conditions under which the great increase of foreign business has taken place outside of France. The book is as suggestive to foreigners as it is to his own countrymen, because it deals with a subject which is international in scope.]

LANGHANS, P. **Der französische Sundgau und die Grafschaft Mömpelgard.** Map. *Petermanns Mitt.*, Vol. 61, 1915, Dec., pp. 464-465. ["Mömpelgard" is better known, to say the least, as Montbéliard.]

LAURENS, HIPPOLYTE. *De l'avenir de notre agriculture régionale.* *Bull. Soc. de Géogr. de Toulouse*, Vol. 35, 1916, No. 1, pp. 98-120.

MAIGE-LEFOURNIER, MATHILDE. *La vie traditionnelle hivernale à Bonneval-sur-Arc (1846 m.).* Ills. *La Montagne*, Vol. 13, 1917, No. 1-3, pp. 1-16. Paris. [Bonneval is in the département of Savoie at an altitude of some 6,000 feet.]

MASSART, JEAN. *Quelques adaptations végétales au climat de la Côte d'Azur.* *Diagrs. Ann. de Géogr.*, No. 140, Vol. 26, 1917, pp. 94-105.

MEDILL, ROBERT. *A little book of Brittany.* ix and 97 pp.; map, ill. McBride, Nast & Co., New York, 1913. 75 cents. 7 x 4½.

MOCAËR, PIERRE. *La question bretonne: Régionalisme et nationalisme.* 35 pp. (Series: Questions Régionalistes). Le Bayon-Roger, Lorient, 1916. 0 fr. 50. 8 x 5.

RAVENEAU, LOUIS. *La fabrique lyonnaise des soieries, d'après une statistique récente.* *Ann. de Géogr.*, No. 137, Vol. 25, 1916, pp. 382-387.

REVERDY, GEORGES. *De la haute vallée du Thoré à la plaine de l'Aude: Notes de géographie humaine.* *Ann. de Géogr.*, No. 141, Vol. 26, 1917, pp. 175-188. [Region to the north of Carcassonne.]

ROUCH, LOUIS. *Un cirque pyrénéen mal connu: Le Cirque du Sisca.* Maps, ill. *La Montagne*, Vol. 12, 1916, No. 4-6, pp. 53-76. [This splendid cirque on the Andorran frontier is practically unknown. The few cartographical representations that have been made contain many topographical errors.]

SCHRADER, F. *Sur une carte du Massif de Gavarnie et du Mont-Perdu.* *Comptes Rendus de l'Acad. des Sci. [de Paris]*, Vol. 164, 1917, May 29, pp. 859-861.

SCIPIONE, SCIPIONI, AND AGO PIETRO. *Il Grésivaudan.* Maps, diagrs., ill. *Riv. Militare Italiana*, Vol. 61, 1916, No. 2, pp. 129-193. [The valley of the Isère above Grenoble.]

VIGIÉ, M. *Géographie du Lodévois: Principalement au point de vue administratif.* *Bull. Soc. Languedocienne de Géogr.*, Vol. 36, 1913, No. 2, pp. 115-130; No. 3, pp. 177-248; Vol. 39, 1916, No. 2, pp. 81-99; No. 3, pp. 163-201. Montpellier. [The region about Lodève, a town in the Garrigues, the dissected scarp front of the southern Cevennes.]

WELSCH, JULES. *Les lignites du littoral et les forêts submergées de l'ouest de la France.* Map, diagrs., ill. *L'Anthropologie*, Vol. 28, 1917, No. 3, pp. 201-233.

WELSCH, JULES. *Les ressources de la zone de balancement des marées dans le centre-ouest de la France.* Ills. *Ann. de Géogr.*, No. 143, Vol. 26, 1917, pp. 344-352.

X. —. *Les villes militaires du bas-Languedoc dans la seconde moitié du XVIIIe siècle.* *Bull. Soc. Languedocienne de Géogr.*, Vol. 40, 1917, No. 3, pp. 42-66. Montpellier.

GERMANY

COUBÉ, STÉPHEN. *Alsace, Lorraine, et France rhénane: Exposé des droits historiques de la France sur toute la rive gauche du Rhin.* xii and 181 pp. Preface by Maurice Barrès. 4th edition. P. Lethielleux, Paris, [1915]. 2 fr. 7½ x 5.

This volume challenges attention from beginning to end because it validates satisfactorily France's historical and economic claim to a portion of the Rhine valley. Against German pretensions over Alsace-Lorraine, based on conquests of the medieval ages, is pitted historical argument of equal weight, which has the advantage of setting forth French priority of possession. A historical tilt of this character can only strengthen French contention the farther back it is carried, for, long before aught was known of Teutons, Alsace-Lorraine was a Celtic domain. M. Coubé might have strengthened his position by remarking that the failure of Germanization in the Rhine province is best proved by the steady easterly expansion of the French language in Lorraine during modern times. This advance is less perceptible in Alsace, where it also exists, merely because of the Vosges obstacle.

It might also be said that the German claim to Alsace-Lorraine as well as to Holland, Belgium, Switzerland, Franche Comté, Champagne, and Burgundy on the ground of racial kinship is altogether fallacious. Northern man, with whom the Teutons identify themselves, invaded all these regions without ever taking root in them and, what is most significant, failed altogether to replace the Alpine stock of Central Europe.

BLACHE, P. V. DE LA. *Evolution de la population en Alsace-Lorraine et dans les départements limitrophes*. Maps. *Ann. de Géogr.*, No. 134, Vol. 25, 1916, pp. 97-115; No. 135, pp. 161-180. [An admirable study.]

RABOT, CHARLES. *La géographie en Allemagne pendant la guerre*. Bibliogr. *La Géographie*, Vol. 30, 1914-15, No. 4, pp. 269-276. Paris.

RÁGÓCZY, EGON. *Das Projekt eines nord-südlichen Grossschiffahrtsweges zur Verbindung der Nordsee (bei Bremen) mit dem Main, der Donau und dem Schwarzen Meere*. Map. *Petermanns Mitt.*, Vol. 62, 1916, Sept., pp. 321-326.

ASIA

TURKEY IN ASIA, ARABIA, CAUCASIA, IRAN

HITTI, P. K. *The origins of the Islamic state. Being a translation from the Arabic accompanied with annotations, geographic and historic notes of the Kitâb Futûh Al-Buldân of al-Imâm abu-l 'Abbâs Ahmad ibn-Jâbir al-Balâdhuri*. Vol. I. xi and 518 pp.; index. (*Columbia University Studies in Political Science*, Vol. 68.) Columbia University, New York, 1916. \$4.00. 10 x 6½.

Dr. Hitti has earned the gratitude of Orientalists for this translation of al-Balâdhuri's history of Moslem campaigns. To geographers the work is important on account of copious references to localities. It covers the early period of the Mohammedan era and is a record of the Arab's conquests over the Byzantines. Al-Balâdhuri is reputed to have been a scrupulous tracer of sources. The campaigns he describes abound in information about the road system of Asiatic Turkey for the period between the seventh and ninth centuries. The geographical value of this work was recognized long ago by Arab geographers. It is the source for Yakut's great work as well as for Mukaddasi's writings.

The extent to which the population of Asiatic Turkey was receiving foreign elements at the time of Islamic expansion is revealed by native records of this type. We read of Persian regiments garrisoned along the coast of Palestine. A northerly transplantation of Arab colonists was steadily maintained, especially at the confines of empire. Of particular interest are the accounts of border struggles along the continually shifting line which separated Christian and Mohammedan dominions.

Most translations of these Arabic texts should be approached with a critical spirit. The Arabs themselves rarely examined the value of the statements they recorded: having supplied the source, they considered their task accomplished. Modern readers therefore have to make up for this deficiency. With this proviso, these ancient notes will deserve examination, and, while they will interest the historian primarily, the geographer will also derive enlightenment from their contents.

HUBBARD, G. E. *From the Gulf to Ararat: An expedition through Mesopotamia and Kurdistan*. xv and 273 pp.; map, ills., index. E. P. Dutton & Co., New York, 1917. \$3.50. 9 x 6.

This description at first hand of parts of the Near East seldom visited by Occidentals is by the secretary of the British delegation to the Turco-Persian Delimitation Commission of 1914. The author has availed himself to the full of the exceptional opportunities afforded by an official journey. His text teems with memoranda of value on the region stretching from the coast of Mesopotamia to the Urmia basin.

Apart from the pleasure derived from the reading of accurately reported incidents of travel in an unusual journey, it is interesting to learn that the frontier line—1,180 miles in length—between Turkey and Persia was finally delimited after more than one hundred years of frustrated endeavors. According to Mr. Hubbard the erratic line of the Turco-Persian frontier with its southern stretch usually left in blank can henceforth be shown correctly and in full. The settlement may nevertheless prove to be ephemeral, as the line passes over a region whose political fate at the end of the war will probably be much discussed. A map of the Turco-Persian frontier on a relatively small scale is given on the inner side of the front cover—a place where it can be easily overlooked. On it the position of the boundary is more especially defined by the location of nearby towns.

Of equal if not greater interest than the tale of discrepancies between the boundary desired by the two countries is Mr. Hubbard's accurate appraisal of this border region. Its natural desolation, enhanced by historical decay, is faithfully described. Probably some of the best pages will be found in the chapters describing Kurdish scenes. Written in a gossiping mood, they form a human document of great interest. The personality of Kurdish chieftains is finely brought out, while the everyday life of their unlovely followers is recorded with insight. And when the writer succeeds in bringing to our nostrils the scent of mountain dust and vegetation from that stern and wild region we cannot help realizing that he is exhibiting genuine literary talent.

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THE FINN IN AMERICA *

By EUGENE VAN CLEEF

At this time it is perhaps of special interest to know the distribution of Finns in the United States, the extent of the Finnish "invasion" into northeastern Minnesota, the results attained by the Finn in his native land and in his new environment, and the possibilities of the Finn as a citizen of the United States.

Distribution of the Finns in the United States

Although Finns dwell in every state in the Union, their numbers are essentially negligible in all but the states of the northern half of the country. Hence, in the map (Fig. 1) showing the states where 500 or more reside, the southern states remain without a dot. The total number of Finns in the United States, including native and foreign born, was in 1910, 211,026.¹ The estimate for 1917 places their number at close to 300,000.

Michigan and Minnesota stand out preëminently as "Finnish" states. Massachusetts ranks next, the cotton and woolen mills oddly enough retaining a sort of magnetic hold upon the Finns, especially the women. Fitchburg and Worcester are the principal points of concentration. New York State ranks relatively high because of the large number of Finns in New York City. The clothing industry in the country's metropolis induces many of the Finns there to become permanent residents.

The western states, Montana, Oregon, Washington, and California, present a sort of anomaly in the problem. A more detailed consideration will be given later, but here it may be pointed out that the rise of the lumber industry in these states, coupled with its disappearance in the Great Lakes region, has been a potent factor in the western migration of

* Acknowledgment is made to Mr. L. B. Arnold, Land Commissioner, of the Duluth and Iron Range R.R., for his many courtesies which have made possible this investigation; to the Finnish people of Duluth and vicinity who have co-operated so generously; and to Mr. O. J. Larson of Duluth who has made possible the publication of this entire manuscript.

¹ U. S. Census, 1910. Unless otherwise stated, all figures are based on this census.

many Finns. The fisheries in the Puget Sound District and farming in all the area have had a secondary influence. The greater number of Finns in California are concentrated in San Francisco.

The southern states show a notable absence of Finns. For example, South Carolina has only 38, Florida 137, Georgia 65, Louisiana 186, Texas 218, Arkansas 30, and Kentucky 32.

Absolute numbers, if isolated, may exaggerate their significance; hence Figure 2 is introduced to show the relative number of Finns in each state

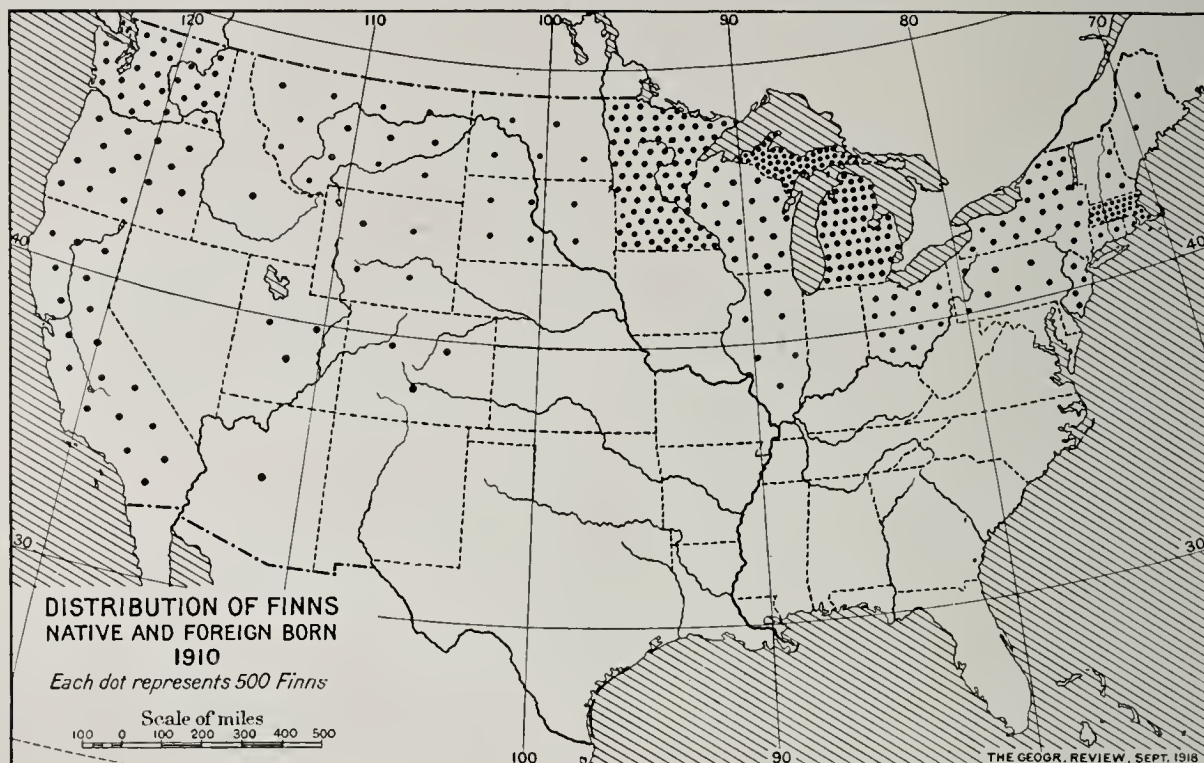


FIG. 1—Cartogram showing distribution of Finns, native and foreign born, by States, 1910. The absence of Finns in the south is in striking contrast with the density in the north. Scale 1:41,000,000.

as compared with the total foreign population. Again the southern states are conspicuous by their lack of a considerable Finnish population. All the western states would seem to have fairly numerous colonies; but when one considers their small total foreign population compared with that of the central and eastern states the seeming discrepancy disappears. For example Wyoming, which shows 3.6 per cent of its total foreign population to be Finns, has a total foreign population of only 59,622, of whom 2,154 are Finns; whereas Ohio, which shows only 0.5 per cent to be Finns, has a total foreign population of 1,621,638, of whom 7,301 are Finns. Probably the most impressive figure on this map is the very low percentage of Finns everywhere, it being nowhere as high as 4 per cent.

URBAN VS. RURAL POPULATION

More than half (54.5 per cent) of the total population of Finns live in the rural² districts of the United States. This is rather notable, for only

² By "rural" is meant communities of less than 2,500 inhabitants.

immigrants from Norway, Denmark, Luxemburg, and Mexico show a similar tendency. The general inclination for foreigners is to concentrate in urban centers. Less than one-third of all "foreign white stock" (31.8 per cent) is located in the rural districts.

Moreover the proportion of Finns living under essentially rural conditions is higher than the figures show. Fresh immigrants gravitate almost immediately towards the mines and camps. In both instances they head-quarter largely in towns of 2,500 or more and hence are enumerated as

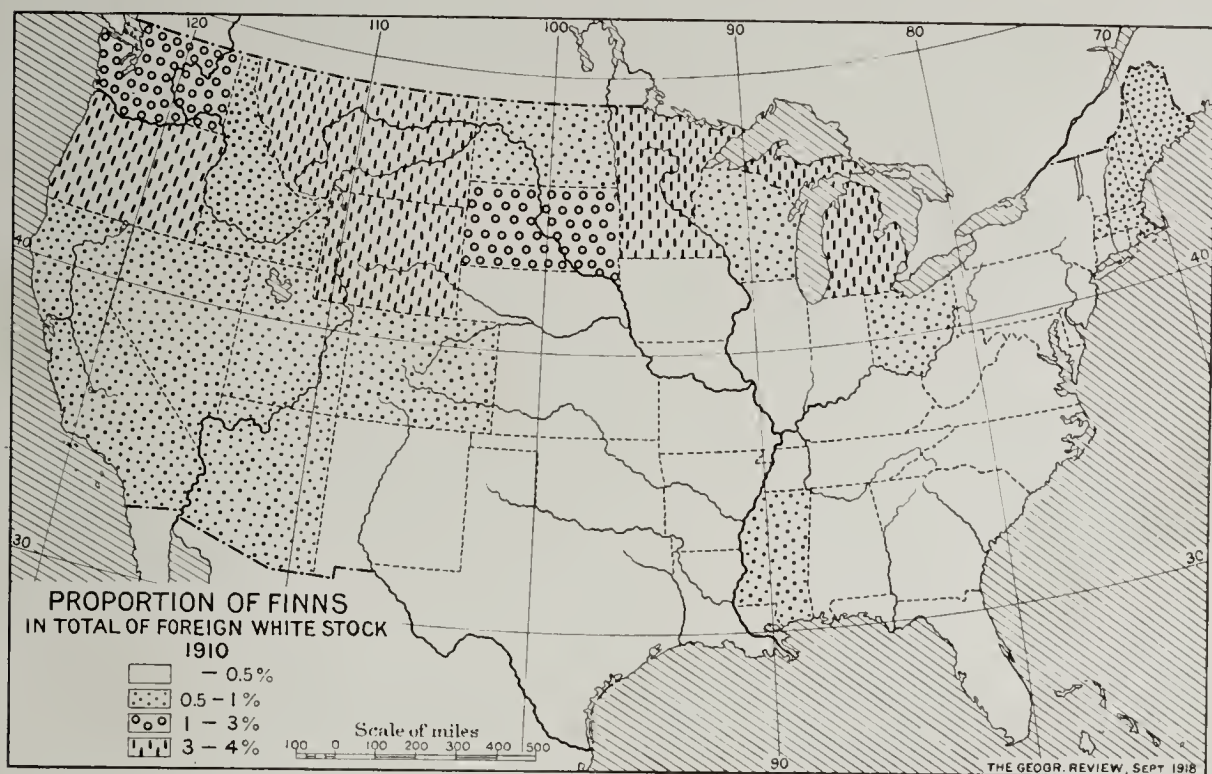


FIG. 2.—Cartogram showing percentage of Finns among the total foreign-born white stock, by States, 1910. Relatively as well as absolutely the south shows lack of attraction for Finns. Scale 1:41,000,000.

those residing in urban communities. Otherwise, if the census were taken in their case on the basis of occupation, the per cents would favor the rural districts. The very strong attraction of the out-door life is exhibited also in the case of those who are native-born but of foreign or mixed parentage, among whom the proportion in the rural area reaches the high figure of 61.7 per cent. The Finns, therefore, may be classified as distinctly a rural people.

In 26 states of the Union over 50 per cent of the Finns live in the rural districts. In such states as Illinois and New York, large manufacturing centers attract the relatively small number who happen to reside there, but these constantly drift toward the land. Interviews with many Finns who have passed through the several stages before reaching the farm, reveal the fact that the congested cities retain the Finn a very short time. As soon as he saves enough money to purchase a small acreage or to claim a homestead he establishes communion with nature and leads a life more attractive and more satisfying to his natural and seemingly instinctive desire to live in the open.

LAKE SUPERIOR DISTRICT

The vicinity of Lake Superior seems to constitute the haven of refuge for the Finns. Their density is greater here than in any other equal area in the country.³ Figure 3 represents the distribution about Lake Superior, and at the same time brings to light the apparent attraction of the iron and copper mines. The region is also forested and accordingly attracts the lumberjack. Northeastern Minnesota presents conditions typical of practically the entire Lake Superior district. For this reason, it was chosen as the scene of the present investigation. St. Louis County (see Fig. 3), in Northeastern Minnesota, has been the principal field for intensive study. St. Louis County has an area of 6,503 square miles. Its total population is 163,274, of whom 16,381,⁴ or about 10 per cent, are Finns. The Finns are engaged in iron ore mining, lumbering, and agriculture. They number about 10 per cent⁵ of the total of foreigners in the mines. The number of men of all nationalities employed in the mines in 1917 was 14,479.⁶

The number engaged in lumbering fluctuates, as most of the Finns in this industry are employed only in winter for logging operations in the woods. Hence employment is generally temporary, and these so-called lumberjacks are oftentimes the miners and farmers of the summer season. A few work in the lumber mills the entire year.

Agricultural pursuits attract most of the remaining Finns. Nearly 60 per cent (or about 1,800) of the farmers of the county are Finns. This number must be multiplied by at least 3 to obtain the total number of Finns on the land, for the families are large. Others are engaged in miscellaneous occupations in the cities. Duluth, the largest city of the county, with a population of 78,466 in 1910, was credited with 2,772 Finns.

THE FINNS IN THE MINES

The absence of large mineral deposits in Finland means that few of the natives are miners. Emigration is mainly from the northerly parts of Finland⁷ where the population is scattered, and where agriculture, practically the only pursuit, is carried on under severest handicaps.

Singularly enough, the first Finns who settled in the Lake Superior district became miners. They left their homes because of depressing economic conditions and in hope of a better future in America. The gold rush of '49 in California attracted a few, but none of them profited. A little later, between 1850 and 1860, about 250 Finns from the copper

³ There is a similar distribution in Canada. The census of 1911 gives 4,301 Finns (about 28 per cent of the total in Canada) in the Thunder Bay-Rainy River district at the western end of Lake Superior. Other large groups are found elsewhere in the Lake region.

⁴ Census of 1910; the estimate for 1917 places the number at from 20,000 to 25,000.

⁵ Estimate of the Oliver Iron Mining Company. Accurate records of nationalities are not kept.

⁶ Report of W. H. Harvey, County Mine Inspector, October, 1917.

⁷ Ninety per cent of those interviewed came from northern Finland, or, if native-born, their parents came from those parts.

mines of Norway and Sweden arrived at Calumet, Michigan, to help in the newly opened copper mines.⁸ This seems to be the only instance of the importation of Finns by an industrial company.

After a short acquaintance with the new land these men wrote home to friends and relatives, sometimes sending transportation tickets, encouraging them to come to this country, where tyranny was unknown and independence was a possibility. The subsequent years, up to the present, have witnessed a steady though not large inflow of their countrymen. The

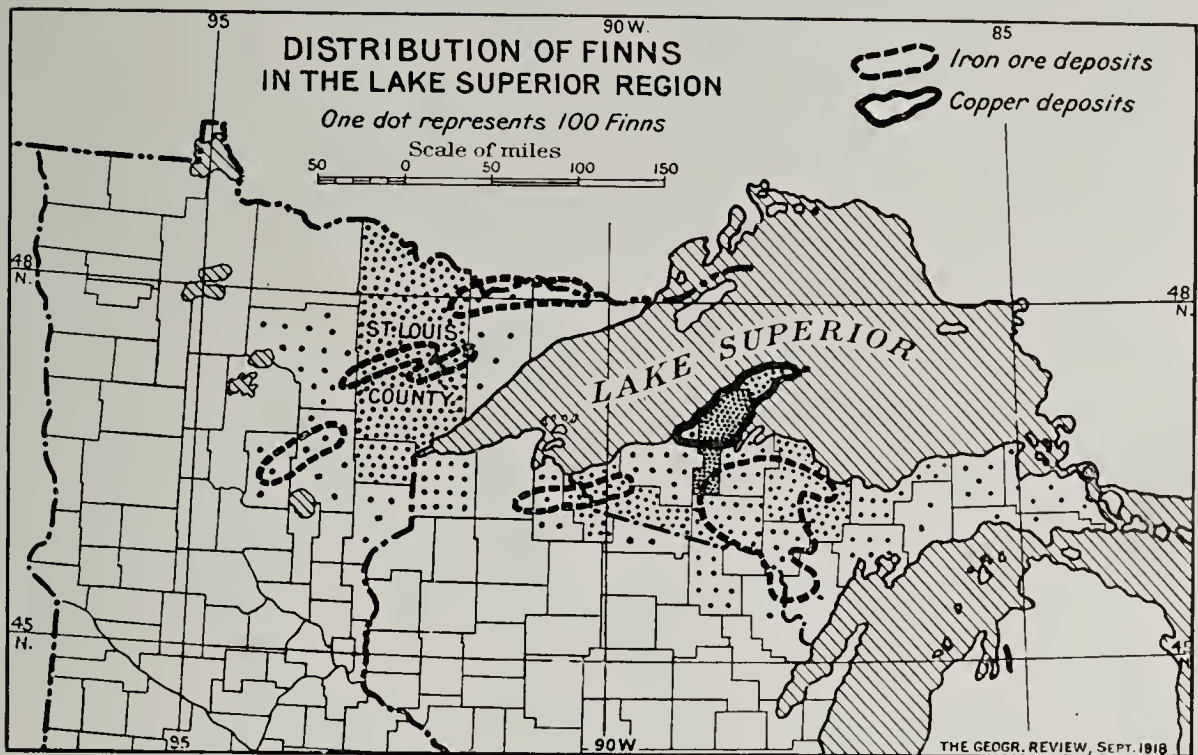


FIG. 3—Cartogram showing distribution of Finns in the Lake Superior Region. This is by far the most attractive region for the Finn in America. Scale 1:9,500,000.

new arrivals could not speak English and had no money. The land was still densely wooded, and the winters were long. Mining was the only occupation open. In the years since the first settlements among the mines of Michigan, successive Finnish immigrants have entered the iron mines of both northern Michigan and northeastern Minnesota. Many who are prominent citizens in these parts today found their opportunity there.

THEIR THRIFT, EFFICIENCY, AND ENDURANCE

But the Finn is not a miner by nature. He is a man of the soil. After working in the mines a few years—the average is from two to five—he uses his savings for the purchase of some land or for taking up a homestead. In some instances, however, after leaving the mines as a place of regular employment, he may return temporarily when in need of money. He is credited with being the most thrifty of all nationalities represented in the mines and lumber camps.

⁸ According to C. H. Salminen, manager of *Finnish Daily News*, Duluth, and others.



FIG. 4—Unusually numerous buildings characterize the Finnish farm. The boulder-strewn highland in the background is a familiar feature of the landscape. Embarass, Minn.

In efficiency in the mines the Finns rank close to the top. They make good timbermen in the underground mines, for they are reputed "clever and ingenious with axe and log." Herein one may see the result of their many centuries of training in the forests of their native land. Their struggle with nature has also developed much resourcefulness. The younger Finns coming to this country today show a considerable proficiency along mechanical lines. Some of them are employed in handling drills and other machinery requiring dexterity.

The physical strength of the Finn contributes to his ability to endure the strains incident to mining. The work is hard, and the winter long and rigorous. Where the open pit process is used, employment does not last throughout the year. Hence many workers must find something else to engage them during the closed season. The relative isolation of the region makes travel to other industrial centers rather expensive. Therefore adjustment is made to practically the only alternative, logging. Hundreds of Finns go to the woods to labor in the deep snow and in temperatures ranging from -15° to -30° F. Their life is camp life, but not after their own choosing. It oftentimes is next to intolerable. Yet doggedness, a sense of responsibility, unusual powers of endurance, enable them to remain throughout the season. They have had vigorous training in the "land of a thousand lakes" and the land of as many hardships.

The Finn in Agriculture

CONDITION OF THE LAND

The Finn has acquired much of his land in northeastern Minnesota as a homesteader, although recently he has become an active purchaser in the open market. His holding ranges from 40 to 160 acres. If he is a homesteader he always possesses the latter amount. For the most part his land is heavily timbered with tall thin spruce and tamarack and the birch with its accompanying underbrush. Occasionally some jack pine is scattered about. More often than not, the desirable timber has been removed by lumber companies before the land is placed on sale, only the stumps remaining; or, if virgin timber be available, it is not in abundance.

The spruce and tamarack land is swampy. It is highland swamp ranging from 1,200 to 2,000 feet above sea level and from 600 to 1,400 feet above Lake Superior. The several moderately sized streams of fair gradient flowing either across the land or near it (Fig. 9) make drainage relatively easy after a clearing has been effected. Oftentimes a few acres, sometimes as much as one-half of a forty-acre tract, consist of swampy land known as "muskeg." The muskeg, which varies in depth from 3 to 21 feet, is a sort of transition swamp verging on the peat stage. This land corresponds almost everywhere to the *Hochmoor* of Germany, Denmark, and Finland. In addition to muskeg there may be a very generous distribution of glacial

boulders of large size (Figs. 4 and 10), especially upon the higher, better drained land most desirable for cultivation.

HUMBLE BEGINNINGS

The Finn builds a little single-room or two-room tar-papered shack (Fig. 5) near an edge of his land where the drainage is good. He will clear about an acre the first summer. When winter interrupts his work he may go to the woods as a lumberjack to earn a little ready money. The next spring he returns to his farm to continue improvements. Should he run short of funds before the following winter he may work for a few weeks as a common laborer on county or town roads. It has been said that the road-building activity of the counties and towns in northeastern Minnesota has been the salvation of the farmer, not merely because it gives him an improved means of communication, but because it gives him employment and funds.

As soon as a few hundred square feet are cleared, potatoes and rutabagas are planted. A cow barn and cow follow. "Where there's a Finn there's a cow" is almost axiomatic. Another year witnesses the addition of a few chickens. Garden, cow, and poultry now assure the pioneer's food supply: he is fairly on the road to independence.

CONSTRUCTION OF BUILDINGS

In the evolution of the farm the construction of buildings plays an important part. One may very safely identify a Finnish farm from a distance by its number of buildings (Fig. 4). Among them may be counted the owner's first shack, his later log cabin, his recent modern dwelling (Fig. 7), his never-forgotten bathhouse, a cow barn, perhaps the old one and the new one with its glacial-boulder foundation, a horse barn, a root cellar, several hay barns scattered over the fields, a tool house, a woodshed, and other miscellaneous special buildings.

The hay barn alone is a means of identifying a Finnish farm (Fig. 6). It is always built of logs spaced several inches apart. The flooring is raised from the ground a foot or two and is likewise made of spaced logging. Such construction allows the air to circulate freely through the hay, keeping it dry and helping to season it. The sides of the barn slope inward toward the floor. This characteristic is determinative. In only a few isolated cases has a Finn erected a modern scientific combination dairy and hay barn.

SLOW DEVELOPMENT OF THE LAND

The cutting of timber, the grubbing of underbrush and roots, the dynamiting of stumps, the piling up of the boulders gathered from all parts of the land, and the draining of the wet places all follow in succession. The work is slow, for the Finn never hurries. Deliberate and determined, he is



FIG. 5.



FIG. 6.

FIG. 5—The first home of the pioneer farmer, a two-room tar-papered shack. The man in the foreground is a Finn, but not the tenant of this hut. Embarass, Minn.

FIG. 6—The hay barn with sides sloping inward toward the floor. It identifies a Finnish farm. Floodwood, Minn.

seldom discouraged. Some day his land will be entirely cleared and beautifully developed. The Finnish immigrant makes an ideal pioneer, a splendid blazer of the trail; but the speedy development of the land awaits the rising generation. Whatever the length of time that must elapse before success crowns his efforts, the fact that a Finn is developing the land is always reassuring. To a farmer in the corn belt these northern lands must seem almost hopeless; but to the Finn, where there is land there is hope. His struggle through the many generations has taught him to keep at the problem until it is solved, if solution there be; and he is thankful for, and appreciative of every little gain. When his farm is well



FIG. 7—The old log cabin, and the modern dwelling: convincing proof of progress. Floodwood, Minn.

along he confines his efforts largely to such crops as hay, potatoes, rutabagas, and minor quantities of rye, oats, and barley. He possesses a number of cows, inclining very strongly toward the development of a dairy farm. Swine are conspicuously absent. A few horses, and not infrequently an automobile, complete his establishment.

REASONS FOR LOCALIZATION IN THE LAKE SUPERIOR REGION

In view of the many hardships with which the settler in northeastern Minnesota must contend, one naturally wonders why the Finns continue to assemble here. Did the first few who happened to come to the copper mines of Michigan so stimulate the successive immigrant flow as to give it a momentum sufficient to maintain itself to the present day? Could the momentum of the first influx have resulted in the concentration of about 150,000 Finns, or three-fourths of all the Finns in the United States, in the Lake Superior district? Why have not the more recent immigrants settled in the central

states? Why have not those who came twenty years ago moved further south after working under such severe strains and in the face of possible failure? To determine whether the factors are geographic in any degree, one needs to consider the natural environment in Finland and to compare it with that of northeastern Minnesota, and to study the life of the Finn in Finland, both past and present.

Finland vs. Northeastern Minnesota

The total population of Finland in 1910 was 3,115,197.⁹ Its area was 144,252 square miles. The density therefore is between 21 and 22 per square



FIG. 8—A typical Finnish log cabin with windows which identify the nationality. The corners of the cabin are boxed off and the logs are squared, the squaring being done after the logs have been put in place. It represents a bit of Finnish mechanical skill. Toivola—"the place of hope"—Minn.

mile, a very low value compared with that in other countries of western Europe.

SURFACE RESEMBLANCES

Finland is a vast region of lakes, rivers, and marshes. Its very name in the Finnish language, *Suomi*, means "swamp land." Lakes occupy 11.73 per cent, swamp and peat surfaces 30.8 per cent of the total area of the country.¹⁰ These figures are approximations, for they do not include large areas that are neither lake, swamp, nor peat bog, yet are very poorly drained. A map¹¹ of Finland showing the wet lands indicates that well

⁹ Census figures: for characteristics of distribution see *Atlas de Finlande*, 1910, 1 vol. of maps and 2 vols. of text, Société de Géographie de Finlande, Helsingfors, 1911.

¹⁰ "There are at least a quarter of a million lakes in Finland." See A. Hettner: *Grundzüge der Länderkunde*, Vol. 1, Europa, Leipzig, 1907, pp. 178-182.

¹¹ Work cited in footnote 9.

over 75 per cent of the surface area may be catalogued under this heading. The surface of northeastern Minnesota is closely similar. In St. Louis County 5.6 per cent of the surface area is lake, and 29 per cent is swamp and peat land.¹²

Finland has been completely glaciated. Excepting for a few small exposures of igneous rocks, the surface is entirely of drift material. Among the few outcrops Pre-Cambrian rocks predominate. Similarities with the Lake Superior region are suggested.¹³ The Finnish geologist Sederholm indicates the possibility of stratigraphical correlation. Both Finland and Minnesota have boulder-strewn surfaces and in their respective localities present scenes that are almost identical. Prominent hills are uncommon; but the range of altitudes in Finland is almost exactly the same as that in St. Louis County. The land rises from about 250 feet close to the Baltic Coast, to 2,000 feet along the Russian boundary. In St. Louis County the range is from 600 feet above sea level at the shore of Lake Superior, to 2,000-2,200 feet in the northern parts of the county.

The streams crossing Finland, like those in northeastern Minnesota, are relatively short but rapid. Minnesota has no such famous rapids as the wonderful Imatra Fall; on the other hand, the variety and frequency of small rapids and falls are strikingly similar in the two countries.

CLIMATIC CORRESPONDENCES

The climates likewise show a close correspondence, that of Finland being somewhat less extreme. The coldest and warmest months in Finland are February and August respectively, whereas those in St. Louis County are January and July. In the former country in January the temperature ranges from 6° F. in the north to 14°-21° F. in the south, whereas in the latter region the range is from 4° F. in the north to 12° F. in the south. In July the range in Finland is from 56° F. in the north to 60° F. in the south, while in St. Louis County it is from 64° F. in the north to 66° F. in the south. There is however a great difference in latitude between the two regions. Finland extends from 60° N. to 70° N.; St. Louis County reaches from not quite 47° N. to 48.5° N. Finland tempered by the warm prevailing southwesterlies blowing from the Gulf of Bothnia and the Baltic Sea shows a very high temperature anomaly—at least 10° F. higher than the normal for the latitude—the divergence being specially great in winter. St. Louis County, in a continental area, is modified by the influence of a considerable body of water only along the short Lake Superior shore line.

The precipitation in Finland averages from 12 inches in the north to 27 inches in the south; in St. Louis County it is much more uniform, averaging from 27 inches in the north to 30 inches in the south. The amount

¹² Figures based on Leverett and Sardeson: *Surface Formations and Agricultural Conditions of Northeastern Minnesota*, *Minn. Geol. Survey Bull. No. 13*, Minneapolis, 1917, p. 56.

¹³ See the section on Finland in Van Hise and Leith: *Pre-Cambrian Geology of North America*, *U. S. Geol. Survey Bull. 360*, pp. 51-53.

of moisture falling as snow, ranges in Finland from 30 inches in the extreme northern parts to 55 inches in the south, and in St. Louis County averages from 50 to 55 inches. The annual distribution of the precipitation may be considered identical in both places. The dates for the appearance and disappearance of both snow and ice are practically the same. February and March are the months of maximum snowfall. Frost may occur in any month of the year in the swamp areas of both regions.

SIMILARITY OF FLORA

With similar soils and climates one may look for a similarity in native flora. The evergreens predominate in the northern parts, while the deciduous trees are most common in the southern portions. Pines, spruce, tamarack, mountain ash, birch, and aspen are the best known among the many varieties of trees. While the species of trees are not in every instance the same, their effect upon the landscape does not differ. The swamp lands in both countries are alike, excepting for the somewhat more extensive low-land type of swamp in Finland. Peat is common to both areas. The wild flowers are strikingly similar, as witness

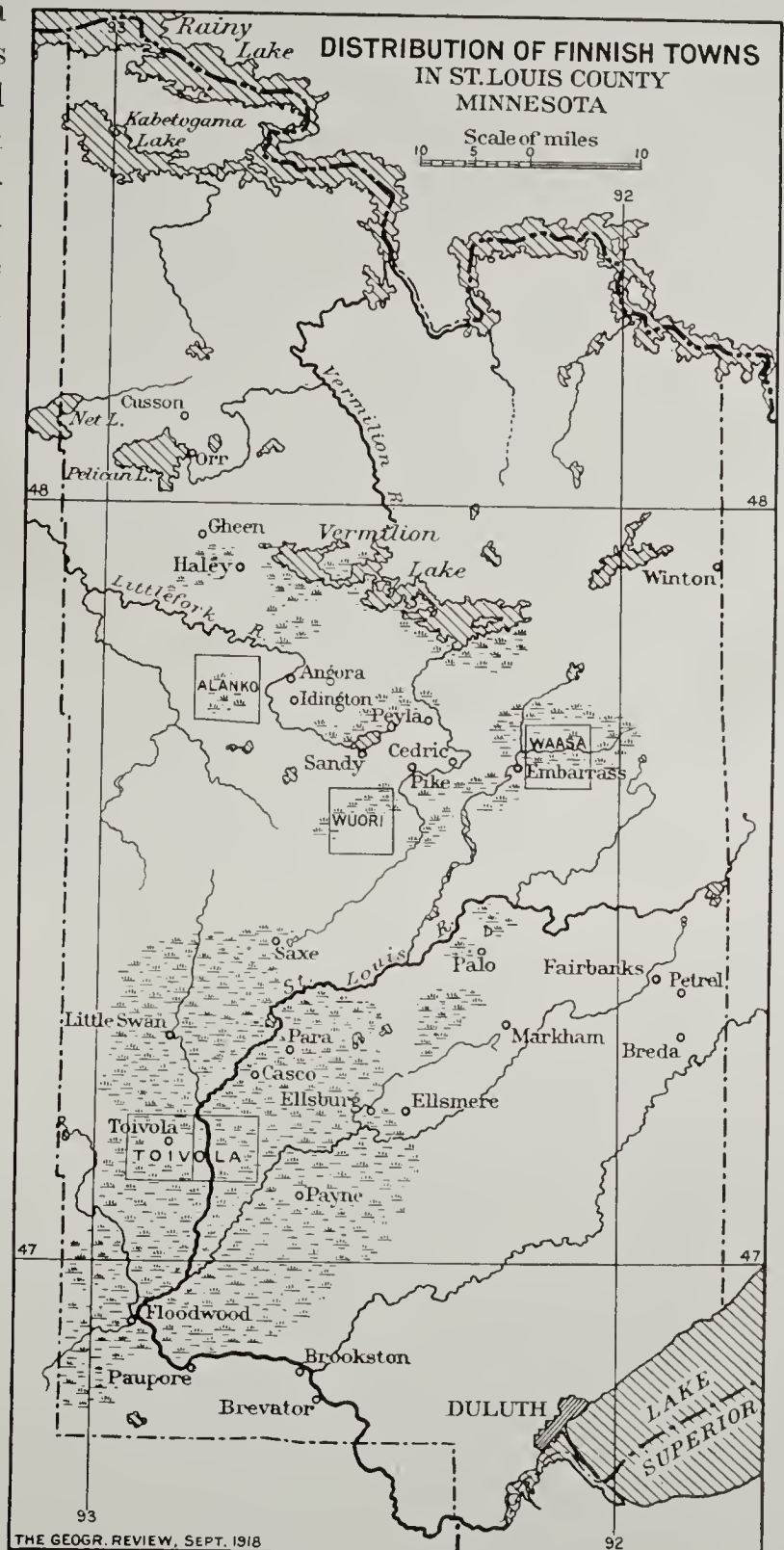


FIG. 9.—Sketch map showing the distribution of towns essentially Finnish in population in St. Louis County. In a few cases there is a fairly large number of other nationalities. Distribution should be noted in reference to swamps, streams and lakes of which only the larger features are shown. Swamps are mapped from Leverett and Sardeson, *op. cit.* footnote 12. Scale 1:1,400,000.

the following description of a scene in Finland which will apply equally well to northeastern Minnesota: "I remember that meadow distinctly . . . a mass of giant bluebells, oxeye daisies, pink phlox,¹⁴ yellow buttercups, and countless other varieties of flowers all growing pell-mell in a chaos of colors."¹⁵

AGRICULTURE

From 80 per cent to 90 per cent of the people in all parts of Finland are engaged in agricultural pursuits. The principal crops in descending order of rank are oats, potatoes, rye, and barley. Wheat is produced in minor quantities in the southwest. Corn is said to be grown as a decora-



FIG. 10—This generous distribution of large-sized glacial boulders is typical of the region selected by the Finnish farmer. Near Chisholm, Minn.

tive plant in gardens. Hay, mostly wild, is important, for it constitutes the foundation of the dairying industry. Truck-garden products are grown for immediate family use. All of these crops are grown in northeastern Minnesota. Excepting hay, they are not grown so largely, but that is only because of the relative newness of the region.

In northern Finland the number of cattle is 500-1,000 per 1,000 inhabitants; in southern Finland the number is not so large, but is still important. Swine are notably few, especially in the north where their density is 0-10 per 1,000 inhabitants.

With respect to live stock Minnesota again resembles Finland. Northeastern Minnesota is developing rapidly into a dairy country. Swine are kept in decidedly larger numbers by the Finns in America than by those in Finland. Yet it may be noted that the Finns in St. Louis County keep fewer swine than do the farmers of other nationalities. This evidently is a reflection of conditions in their native land.

¹⁴ This name may apply to the plant known as fireweed, very common and attractive in northeastern Minnesota.

¹⁵ Paul Waineman: *A Summer Tour in Finland*, New York, 1908.

INDUSTRIES AND THE CO-OPERATIVE PLAN

The variety of important industries in Finland is very small, as might well be expected in a region where raw materials are so limited and where agriculture offers practically the only visible means of gaining a livelihood. Lumbering takes first rank. Saw-mills are very numerous, especially in the coastal districts. Paper making ranks second. Beyond these two industries it is not possible to rank any of consequence as yet. St. Louis County differs only in having iron ore in tremendous quantities and in the consequent development of the mining industry.

The Finns have much faith in co-operative establishments for the conduct of their affairs, as is evidenced by the numerous co-operative



FIG. 11—The Finn places his grain and hay crops on driers, a custom brought from home. This is an oat crop at Palo, Minn.

creameries, co-operative general merchandise and grocery stores, co-operative savings banks, and other co-operative institutions. In 1913 there were 2,167 co-operative societies in Finland with a total membership¹⁶ of 196,000. Into northeastern Minnesota co-operative institutions are rapidly finding their way. While all varieties are not yet represented there they may be found in the Lake Superior region as a whole. In addition the co-operative hotel has grown to be a significant institution.

The Finns in Finland

In order that the Finns in America may be fully and properly appreciated, a glimpse of their life in Finland is essential.

ORIGIN

The history of the Finns is wrapped in romantic mystery. Theories as to their place of origin and their wanderings are abundant. That they are

¹⁶ Hannes Gebhard: Co-operation in Finland, London, 1916.

of Asiatic origin has been very generally held. Keane says, "Many of the European Finns, and especially the Baltic group, have undoubtedly been largely assimilated to the surrounding populations, although even these retain certain physical and mental characters, such as peaky eyes, somewhat flat face, round head, dull sullen temperament, which, combined with their pure Ural-Altaic speech, betray their primordial Mongol affinities."¹⁷ It is however rather with Turanian peoples that affinities may be found. The case is stated by Haddon¹⁸ who assigns to the Finno-Ugrian stock a home about the headwaters of the Yenisei. The Finnish branch wandered across the Urals, the true Finns ultimately proceeding up the Volga into what is now Finland. But this view of the Asiatic origin of the Finns is not universally held. Ripley claims for them a Nordic origin on anthropological grounds.¹⁹ What seems to be near the truth of the matter is suggested by Dominian²⁰ who states that while the culture is Asiatic the Finns are racially a blend of Nordic and Asiatic. Recent anthropometrical work points to a diversity of origin. The Finns were formerly described as a brachycephalic people, a feature in agreement with their supposed Turanian origin. Actually both dolichocephalic and brachycephalic forms are found, in proportions varying in various parts of the country.

The principal recent work has been done by Dr. F. W. Westerlund, who with the assistance of others took the head measurements of 131,697 men of about 21 years of age.²¹ His work has been summarized by another Finnish authority²² who gives the following figures: In southwestern Finland 55 to 58 per cent are dolichocephalic; in some parts of southern Finland as many as 70 per cent; in western Finland 65 per cent are dolichocephalic. In central Finland only 40 per cent are in this class. In eastern and northern Finland 73 to 88 per cent are brachycephalic. It is from the latter region that most of the Finns in America come; from whom we derive our impressions with regard to the whole of Finland.

MYTHOLOGY; NATURE WORSHIP

Something more of the lives of the early Finns is related in their mythology. That they have always been nature worshippers is evident throughout their literature. "The ancient Finns were worshippers of the sun and of fire; they were highly superstitious and had faith in miracles and magic. . . . Their supreme God was Ukko, the God of Thunder, who lived in the clouds and who ruled human destiny."²³ They worshipped

¹⁷ A. H. Keane: *Ethnology*, University Press, Cambridge, 1896, p. 305.

¹⁸ A. C. Haddon: *The Wanderings of Peoples*, University Press, Cambridge, 1912, pp. 18, 19.

¹⁹ W. Z. Ripley: *The Races of Europe*, New impression, New York, 1915, p. 365.

²⁰ Leon Dominian: *Frontiers of Language and Nationality in Europe*, New York, 1917, p. 102.

²¹ See also the work cited in footnote 9, Vol. 2 of text, p. 56 of Ch. "Statistique démographique." See also the cartogram showing proportional distribution of forms.

²² J. J. Mikkola: "Suomen kansa antropologisessa suhteessa," in Vol 1 of *Oma Maa*, 6 vols., Porvoo, Finland, 1907. This work is an encyclopedia of Finland. The statements in the text were summarized from the above article and were translated from the Finnish by Dr. K. V. Arminen of Duluth.

²³ George Renwick: *Finland Today*, New York, 1911.

Tapio, God of the Forest; Ahti, Ruler of the Waters; and Tuoni, Lord of the Nether Worlds. The sons and daughters of these gods were the gods and goddesses respectively of the sun, moon, stars, fire, and air. "In the Finnish mythology, the air and meteorological phenomena occupy the foremost place among the manifestations of the Divine."²⁴ The modern Finns still exhibit an intense love for and devotion to the open air. No weather seems too severe, no land too poor to prevent their deriving from it something well worth while.

The very names of the Finnish people are based upon natural features. A short list of the most common names with their English meaning is worth giving: Lahti, "bay"; Koski, "waterfall"; Vuori, "mountain"; Harju, "ridge"; Hirvi, "moose"; Korpi, "swampy woodland"; Järvi, "lake"; Nurmi, "pasture"; Joki, "river"; Niemi, "cape"; Saari, "island"; Koivo, "birch"; Kangas, "moor"; Hirsi, "timber"; Kantola, "stump land." These names occur as frequently among the Finns as "Smith" and "Jones" among Americans. Some estimates give 60 per cent as the proportion of Finnish names based upon topographic features.

MUSIC

The music of the Finns reflects their environment. It is written largely in the minor key. Sadness, seriousness of life's struggles, vain hope, and work, work, work, are the words and expressions that pass through one's mind as one listens to their melodies. Some of their folk songs, however, are quite cheerful. One is reminded of rapids and waterfalls separated by quiet reaches. The song is quite different from the heavily accented folk song of the Slavic peoples of southern Europe. It seems to be very decidedly influenced by the presence of the numerous swiftly-flowing streams of Finland.

THE KALEVALA

One of the most interesting expressions of Finnish life is the great Finnish epic, the Kalevala,²⁵ a dramatic record of the struggle for existence that has ever confronted the Finns. In Finland it is studied in the schools, and in this country dramatized selections from it are presented on gala occasions.

The Kalevala is a splendid record of the response of a people to their geographic environment. A complete analysis of it is not possible here. Yet some extracts must be cited, for modern Finnish agriculture and respect for nature's gift to mankind could not be fully appreciated without a little reflection upon some of the verses of Finland's wonderful epic.

It was common in early times, and in fact to within the last twenty-five years, for the farmer to burn over the land that its fertility might be increased. Experience and scientific investigation have shown this proceed-

²⁴ J. C. Brown: *People of Finland in Archaic Times*, London, 1892.

²⁵ Accented on the first syllable.

ure to be very unwise, for the land loses its fertility very rapidly three to four years after the burning. In the Kalevala reference is made to the burning of the forest that the ashes may enrich the soil:

“Hark! the titmouse wildly crying,
From the aspen, words as follows:
‘Osma’s barley will not flourish,
Not the barley of Wainola,
If the soil be not made ready,
If the forest be not leveled,
And the branches burned to ashes.’”²⁶

A familiar picture of the Finnish landscape is given in the farewell song of Pohyola, daughter of the Rainbow:

“Send to all my farewell greetings,
To the fields, and groves, and berries;
Greet the meadows with their daisies,
Greet the borders with their fences,
Greet the lakelets with their islands,
Greet the streams with trout disporting,
Greet the hills with stately pine trees,
And the valleys with their birches.
Fare ye well, ye streams and lakelets,
Fertile fields and shores of ocean,
All ye aspens on the mountains,
All ye lindens of the valleys,
All ye beautiful stone lindens,
All ye shade trees by the cottage,
All ye junipers and willows,
All ye shrubs with berries laden,
Waving grass and fields of barley,
Arms of elms, and oaks, and alders,
Fare ye well, dear scenes of childhood,
Happiness of days departed.”²⁷

Among the many favorite trees of the Finns, the graceful white-trunked birch is most admired, indeed one might almost say it is revered. Even in northeastern Minnesota the Finn will stop before a beautiful group of nodding birches to admire the clean white dress of bark and the spreading branches that seem to bid him welcome. The Kalevala makes clear why his love for the birch is so enduring. The tree speaks:

“ . . . I, alas! a helpless birch tree,
Dread the changing of the seasons,
I must give my bark to others,
Lose my leaves and silken tassels.
Often come the Suomi children,
Peel my bark and drink my lifeblood;
Wicked shepherds in the summer,

²⁶ Kalevala: Epic Poem of Finland, translated by J. M. Crawford, Cincinnati, 1888; passage from Rune II, “Wainomoinen’s Sowing.”

²⁷ *Ibid.*, Rune XXIV, “The Bride’s Farewell.”

Come and steal my belt of silver,
 Of my bark make berry baskets,
 Dishes make, and cups for drinking.
 Oftentimes the Northland maidens
 Cut my tender limbs for birch brooms,
 Bind my twigs and silver tassels
 Into brooms to sweep their cabins;
 Often have the Northland heroes
 Chopped me into chips for burning;
 Three times in the summer season,
 In the pleasant days of springtime,
 Foresters have ground their axes
 On my silver trunk and branches,
 Robbed me of my life for ages.''²⁸

THE FINNS TODAY

The Finns have struggled against titanic handicaps of physical circumstance. With the country a vast region of lake and morass, with only diminutive areas here and there suitable for cultivation without the necessity of drainage, with lowland pockets in which cold air may collect to cause premature frosts and destroy in a night that which represents the labor of months; with few raw materials for the manufacture of articles that might aid in the maintenance of prosperity; with no surplus of food for storage over periods of scarcity; with all these factors to obstruct their way, they nevertheless have risen among the peoples of the earth to a position which many might well envy. "One can not but be impressed with the industry and pluck of this valiant little people, and feel in sympathy with the Finnish economists who see in the geographical location and the magnificent water power of their country the basis for a great development in the future."²⁹ But meanwhile growing political oppression has added a final weight of adversity and many Finns, giving up hope of bettering their condition in Finland, have sought freedom and opportunity in the United States.

The Finns in Northeastern Minnesota (St. Louis County)

Yet man is the creature of his native environment however ungrateful it may be. Its strong hold is exemplified here: given freedom and land the Finn in the United States will select an environment that reminds him of the home of his fathers. From what has been depicted thus far we are led to the conclusion that the attraction of the Finn to northeastern Minnesota has a geographical basis. It remains to offer direct evidence in confirmation.

²⁸ Kalevala: Epic Poem of Finland, translated by J. M. Crawford, Cincinnati, 1888; passage from Rune XLIV, "Birth of the Second Harp."

²⁹ W. E. Lingelbach: Geography in Russian History, *Popular Science Monthly*, Vol. 86, 1915, pp. 5-24.

INTERVIEWS WITH REPRESENTATIVE FINNS

Sixty Finns, many of them heads of families, representing various walks of life, have been interviewed by the writer. Some of these people were in a position to speak for hundreds of others and therefore their

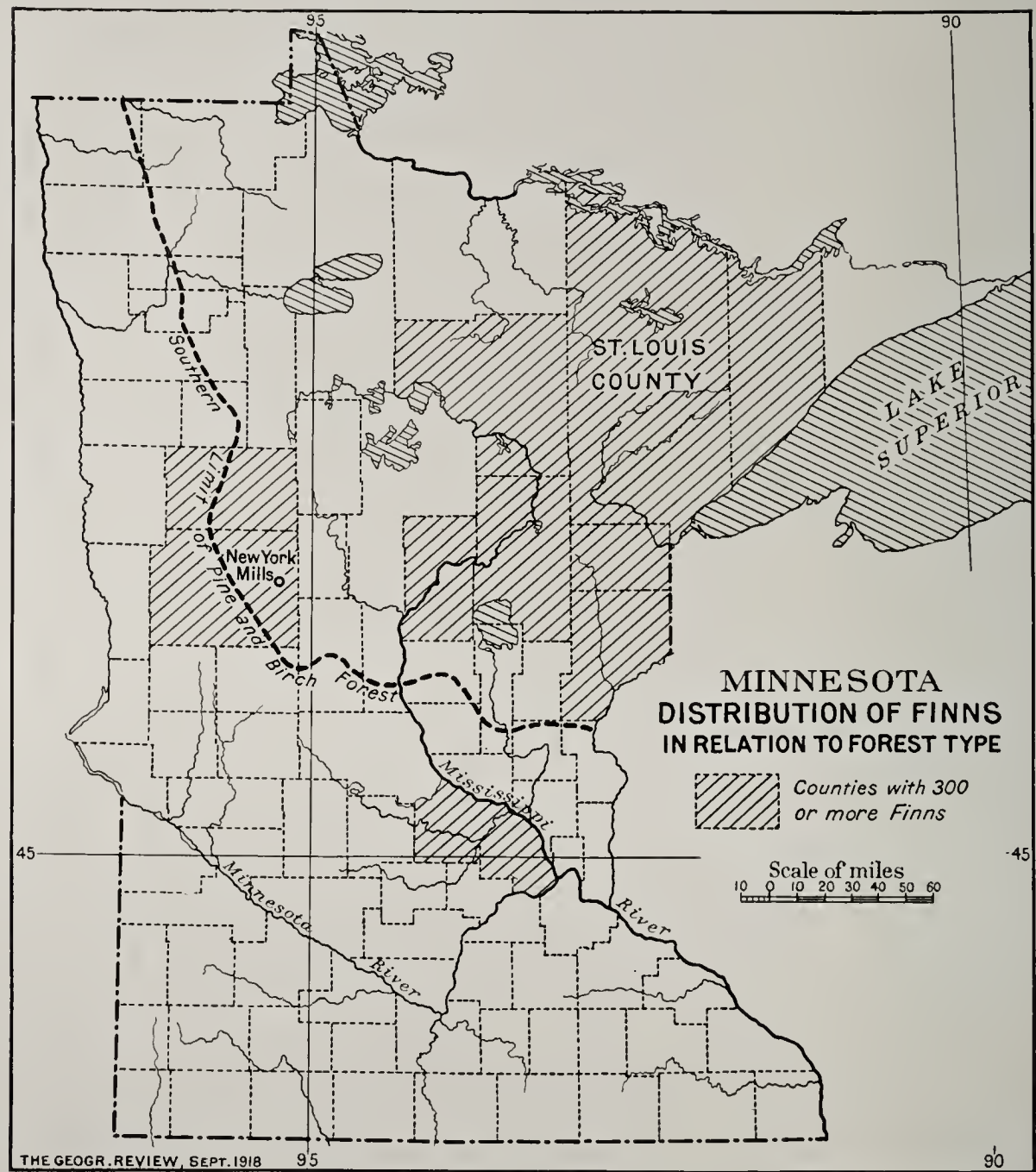


FIG. 12—Correspondence of Finns and the coniferous and birch forest. New York Mills accounts for most of the Finns in the county in which it is situated. Scale 1:5,100,000.

statements are representative of large numbers. Further, employers of from just a few Finns to upwards of 1,500 have been interviewed. The discussion that follows is a summary of the many opinions expressed by both Finns and non-Finns, and may be accepted as unquestionably reflecting reliable and accurate points of view.

With no more than ten exceptions, everyone interviewed volunteered unqualifiedly some geographic element as the principal reason for either

the establishment of Finnish colonies in northeastern Minnesota, or for their persistence in spite of the adverse living conditions. Climate ranks first among all the reasons assigned. Of 42 interviews, 30 indicated climate as the prime cause for settlement in the northern United States, instead of central or southern, and 12 asserted that friends were the influencing factor. Of these 12, all but 2 stated as their reason for remaining in northeastern Minnesota the similarity of the country to their homeland, both in general appearance and in climate. Again, emphasis is laid upon the fact that these 42 interviews are representative of the opinions of thousands of Finns. A few quotations will be significant. These are in reply to such questions as "Why did you come to St. Louis County?" "After your arrival and your observation of the rather unpromising conditions, why did you not go further south or return home?" "Why have you remained in these parts so long, when you have known of opportunities elsewhere?"

A clerk in charge of a Finnish co-operative store in a township populated by 59 Finns and their families replies: "The climate is similar to that in Finland. The winters here are somewhat less severe; the summers are a little warmer, but the days are shorter than in Finland." A student and school-teacher who has been in this country for ten years and has experienced the struggle for existence says: "Some came to work in the mines to make money, as my brother did, intending to return. But, like others, after a few years he quit the mine and began farming, his natural occupation. The similarity of this north country to Finland caused those who came before me to become enthusiastic and to send for their friends and relatives." According to the County School Supervisor of Agriculture, a Finn whose father claims to be one of the first two Finnish settlers in St. Louis County, "even now they [Finns] will buy land here in preference to taking up homesteads elsewhere even when conditions for farming are easier." A Finnish farmer of long residence, well acquainted with farming conditions in other regions, states: "Hearing of greater opportunities to make money elsewhere the Finns will not leave, for climate is the attraction here." "The Finns don't know how to choose land, for they select the stony and poorly drained lands seemingly in preference to the dry lands." This is the opinion of a Finn of many years experience in St. Louis County. He surmised that since their experiences in Finland had been with such poor land these similarly appearing areas "made them feel at home."

Many referred to their love for the deep snow and their admiration for the beautiful glacial lakes set among the dense evergreen forests. One who had seen much of the United States says that nowhere are the views so nearly like those in Finland as in the vicinity of Ely, in the northern part of St. Louis County. The myriads of lakes, the boulder-strewn inter-lake areas, the extensive woods of pines and birches are "just like home."

Several attempts have been made to colonize parts of the south with

Finns, but all have failed. Florida and Georgia were the states in which the principal efforts were put forth. Malaria played havoc, and the remnants of each colony returned to the north. Others have gone south only to find it too warm. Some have traveled westward to try their fortunes

in a region not so warm as the south but milder than in Minnesota; they likewise have returned to struggle with the five or six months of a wet spring, a cool summer, and a braeing autumn, and six or seven months of a cold, snowy, but exhilarating winter.

Most of those who have gone west and remained there are engaged in lumbering, mining, and fishing. They have migrated largely in the path of the first two shifting industries. Many are fishermen, farmers, and some even shipbuilders. One of the largest canneries on the Columbia River is owned by a Finnish co-operative company. Until recently most of the migrants have been unmarried men and women. The women re-



FIG. 13—A contrast: modern hayrake and the ancient boots. These home-made boots are true to type, representing the Finnish style of a century or more. The farmer has been a resident of this district for 17 years. Floodwood, Minn.

ceive high wages as housemaids in western homes. Higher wages are generally the magnet that attracts; but the attraction seems to diminish in strength after a year or two, and the return of the adventurers to northeastern Minnesota follows in due course.

Every attempt to get away permanently from the Lake Superior region has failed. Thus it may be stated unhesitatingly that while non-geographic factors have played a part in the settlement of Finns in northeastern Minnesota, they have been only incidental, and the geographic factors have been primary. Clannishness has played its rôle only in so far as it has meant migration by groups; but the place of settlement by the

group, or the forerunners of a group, has been determined by natural influences.

Since the sum total of geographic conditions reflect themselves in citizenship it is but proper to turn the investigation toward the question of the Finn as a settler and a citizen.

THE FINN AS SETTLER AND CITIZEN

Perseverance, doggedness, tenacity of purpose, and endurance characterize the Finn. These qualities oftentimes develop into extreme, even detrimental stubbornness. He has a strong desire for independence, an ambition to own a bit of land and to free himself from all "bondage." His fondness for the land is obviously the result of the centuries of influence of his native environment, but his zeal for the attainment of independence, to the extent even of complete isolation, seems to have resulted from the long period of political oppression.

The Finn is frequently stolid and phlegmatic until opposed by some one or some idea not to his liking, when he becomes thoroughly aroused. Among the lumberjacks and miners this spirit has often led to serious disruptions and sometimes even murder. However, it would be an injustice to the Finns as a whole to imply that this is as common a characteristic as is their attitude of suspicion.

The Finn's suspicion is difficult to explain. It is a most unfortunate characteristic. Either tribal raids of ancient times or comparative isolation on the scattered farms of Finland is the cause. The latter seems very plausible, for where there is isolation and little opportunity for self protection a stranger will necessarily be under suspicion until he proves his good will. However the idea of fear is not to be associated with the Finns, for few people are as courageous.

EDUCATIONAL ASPIRATIONS

The Finn appreciates the value of education. He is an enthusiastic reader. There is said to be less illiteracy in Finland than in any other country. According to the census statistics for 1910 of persons of 15 years of age and above only 9 per 1,000 are illiterate (unable to read). In Minnesota the Finn demonstrates his desire for mental growth by the attendance of his children in the public schools and his own attendance at night school. "The Finns demand schools no matter how remote they may be. The daily attendance record of their children is very high," says the St. Louis County Superintendent of Schools. In a town on the Mesabi Range, Minnesota, where the Finn constitutes only about one-tenth of the total population, the Superintendent of Schools reports that "he is the backbone of the night school. Out of a total attendance of 900 over 500 were Finns." Figure 14 illustrates the type of rural school which the

Finn attends. While he is not directly responsible for the modernity of the structure and the system of teaching which has been developed within it, he must be credited with his willingness to contribute toward its support and toward the introduction of modern equipment.

Further evidence of educational aspirations is furnished by the extent of the Finnish press in the United States. Including four yearbooks, one may count 29 periodical publications. Of these, seven are Socialistic, one is an organ of the I. W. W., and the rest are liberal. The total circulation of these publications is as follows: Socialist 29,000, I. W. W. 3,500, liberal 59,000, yearbooks 20,000. This gives a grand total of 111,500. These



FIG. 14—A recently erected rural school house in the French River district of St. Louis County. It is one of the most modern structures of its kind in the country. Nearly all the pupils attending the school are Finns.

figures do not all represent different individuals who read these periodicals, for some subscribe to several of them. A single subscription however may reach many individuals: one must take into consideration not only the several members of a usually large family but also the fact that many Finns live in community houses (co-operative hotels) and take advantage of the co-operative subscription.

The ability of so many Finns to read may be traced to the church, which is dominantly Lutheran. Over 80 per cent of the Finns are Lutheran (in America probably only 60 per cent). The church requires that every member be able to read the catechism and the Bible. Some Finns have ventured the opinion that the reading done by the masses does not go beyond church literature. Whatever truth there may be in this, the fact remains that nearly all Finns can read, that quite as many can write, and that they possess a keen appetite for learning.

HEALTH AND HYGIENE

Strangely, the appetite for learning and the high state of intelligence among the Finns have not served to improve all their hygienic environment. In general all the home and business establishments which were visited were immaculately clean. This was found to be so, however humble



FIG. 15—The children in the upper group have just started school; they cannot talk English. Those in the lower group have been in school little more than a year and can talk English. Notice how readily these Finnish children become assimilated. Those in the lower group seem to have lost some of their foreign features. (Photo by Miss Betty Stonerock, Little Swan, Minn.)

the home; but, with only a few exceptions, proper ventilation was lacking. This is proving the death knell of many a worthy Finn, for it is courting successfully the spread of tubercular diseases. Furthermore the belief is still common among many of the older Finns that diseases are not contagious and that the contraction of a disease is the will of God. A similar apathy towards ventilation is shown in the management of their barns. Diseases among their live stock are all too common.

In partial justice to this attitude toward ventilation one should note carefully at least one important responsible factor. In the north of Finland it is bitterly cold in winter, and fuel, excepting wood, is scarce. The atmosphere is humid, and the sensible temperature is therefore quite low. Under these circumstances, conservation of heat as a matter of economy has undoubtedly led to the sealing of the log cabin windows and doors. Isolation from medical help has readily established credence in the theory that disease is not communicable and is incurable if the Finnish



FIG. 16—The Finnish bathhouse. The man is holding a couple of Finnish rakes. Floodwood, Minn.

bath does not prove effective. The faith of centuries cannot be broken in a single generation, and failure on the part of the immigrant to reform at once can be understood. The teaching of the principles of hygiene and sanitation to the children, however, in the magnificent rural and city schools of the county is proving an effective agency for betterment of home conditions. The rising generation will not have the faults of the older people.

THE BATH

The bathhouse (Fig. 16) is the "sign of the Finn." It is one of the first of the many buildings to be erected upon his farm. Figure 17 is a photograph of a stove in the bathhouse. That the house is dark is well attested by the picture. Glacial boulders gathered about the farm are piled up so as to leave a low ovenlike space at the base, extending well back under the rocks. A fire is built in this stove and allowed to burn only until

heat has penetrated every stone. Buckets of cold water are then thrown upon the stove, and a vast cloud of partially condensed steam fills the small room. Occasionally a single special vent in the roof allows the smoke and the excess steam to escape. But more often the cracks in the walls and ceilings and the space around the door casement perform the same function. When the latter is the case the uninitiated might suppose the bathhouse to be afire. The neighborhood knows when a Finn bathes, for the smoke and clouds issuing from all sides of the bathhouse are an index



FIG. 17—The stove in the bathhouse of Fig. 16.

to what is happening within. Several platforms at varying heights around the room allow of a certain adjustment to the degree of heat. The bather beats himself with a bunch of birch or aspen leaves. After about ten to twenty minutes in the steam bath he retires to a small adjoining room where he dashes cold water upon himself. He then dries himself and runs to his house where he dresses. In winter he may roll in the snow before returning to dress. For nearly all ailments the Finn applies one of these vapor baths. His training from childhood enables him to endure its rigors, and hence the benefits he derives are large. His faith in it is unbounded.

The Finnish bath introduces an element in the survival of the fittest, for babies are subjected to it. The infant mortality is very high. Were it not for the anti-ventilation sentiment among so many Finns their health would undoubtedly rank first among the peoples of the earth. Those of them who do observe the modern principles are rarely ill.

Whole families very frequently bathe at the same time. The house is large enough to accommodate from eight to ten people if necessary. Herein is undoubtedly one of the basic reasons for the high moral plane of the Finn. Members of both sexes, beginning with childhood, are educated in the form of the human body and, thereby, that ignorance in later life which so often accounts for sexual immorality is at once discounted.

THE FINN AS A WORKER

Reference has been made to the excellence of the Finn as a worker. An employer of large numbers of Finns says: "We find that a great many of the Finns are very good men in every way; not only are they sober and steady, but they remain at their work for a period of years. These belong more often to the Temperance class." The Temperance class consists of the non-Socialists. Employers state that about 25 years ago the honesty of the immigrant Finn was never to be questioned. Today this statement does not appear to be so generally true, especially in the lumber camps. The change has been attributed to the spread of radical Socialism among them.

POLITICAL PARTIES

Politically, the Finns may be grouped into two classes, the Socialists and the Temperance or Progressive party. The Socialists are subdivided into two classes, the Reds and the Yellows. The Reds are the more radical and advocate force, if necessary, to accomplish an end; the Yellows oppose force and foster legislation as the best means for accomplishing a purpose. Some of the radicals have helped swell the ranks of the I. W. W. Socialism is growing rapidly, although the Progressive party says the days of the Socialists are numbered. The conservative Socialists credit themselves with all real progress attributed to the Finns. The Progressive class disagrees, crediting them only with the organization of modern athletic clubs and community opera houses.

The political aspect of the Socialist versus the Progressive party movement perhaps should receive no attention in a geographic discussion. Yet, the recent introduction of Socialism has influenced these people so strongly that it cannot properly be passed without some consideration. The question has often been asked, "Why should the principles of Socialism have found such fertile soil among the Finns?" Nearly 40 per cent of the population of Finland and perhaps 25 per cent of Finns in America now belong to the Socialist party. Most of the latter are settled in the mining districts. Geographic conditions may answer the question in part at least. The struggle with a climate that makes crops uncertain, the tilling of a soil that is difficult to drain, and the relative isolation of the farm—all increased in their severity by the Russian autocratic rule—prepare the individual to accept almost anything that savors of a somewhat easier life. In Minnesota, where the Finn labors in a lumber camp hardly fit for human habita-

tion, he soon develops an antipathy toward employers that is not easy to counteract. He then becomes a fit subject for conversion by agitators of the radical type and is easily won over. In striking contrast, however, is his attitude after he has established himself upon the land and has had an opportunity to experience the privileges of independence, even with hard work.



FIG. 18—Excellent types of Finns: both leaders in their fields of work. On the left the former Mayor of Eveleth, Minn. On the right an attorney of Duluth, a man of ability and a leader among both Finns and Americans. He arrived in America at the age of 5 years.

DEVELOPMENT OF LEADERSHIP

The above statements might give rise to erroneous impressions relative to the desirability of the Finn as a citizen. It will, therefore, be worth while to look at the other side of the shield and note what sort of leadership has developed among them (Fig. 18). The last mayor of Eveleth, Minnesota, a city of about 8,000 inhabitants, was a Finn. He is a young man possessed of an aggressive spirit and of excellent business ability. He offers an example that seems to discount the common assertion that the Finn has no capacity for business affairs. The chief of detectives of Duluth stands as another splendid example of young Finnish leadership. The medical field has its quota of Finns who rank high, and the legal profession is worthily represented. Many schoolteachers in the county are Finns. They rank among the best in the state, and some have made scholarship

records in the normal schools that might well be envied by their non-Finnish classmates.

Respecting the Finn's place in world civilization it is interesting to note the rank assigned his country in Huntington's "Civilization and Climate."³⁰ Excluding the northern portion, Finland is ranked "high," on a level nearly identical with that awarded the Northern Prairie states. Classified on the basis of "human energy," Minnesota is somewhat more highly favored; but for southwestern Finland the ranking still is "very high." Accordingly the settlement of Finns in northeastern Minnesota is perfectly natural.

A GLIMPSE INTO THE FUTURE

The Finn in Finland and the Finn in America present both similar and contrasting aspects. These have been discussed in the light of geographic conditions, with only occasional digressions to give a better background for the point of view. Now, in the light of the past and present, may something be ventured as to the future?

The similarity of topography, soil, and climate in Finland and northeastern Minnesota, it would seem, has been most influential in the settlement of Finnish immigrants in that part of the United States. The region is still thinly populated, and those interested in its further development are encouraging foreigners to settle. Should they seek Poles, Bohemians, Italians, Finns, or some other nationality? Considering the Finn's virtues and his defects and the fundamental facts of his evolution within a well-defined environment, there is no doubt in the mind of the writer that in the Finnish immigrant lies an assurance for the agricultural development of northeastern Minnesota. All his imperfections are not of his own making and can be corrected under proper influences. In the main, his life, his habits, and his customs have been shaped by certain unmistakable geographic conditions. These conditions are reproduced in northeastern Minnesota. The region has attracted him by reason of its general physical resemblance to his homeland, and thus far he has met with a degree of success in it which no other nationality has known. These facts should be recognized that they may be made available in the upbuilding of this part of our country.

³⁰ Ellsworth Huntington: *Civilization and Climate*, Yale University Press, New Haven, 1915; reference on p. 200.

ON "SAVSSATS": A CROWDING OF ARCTIC ANIMALS AT HOLES IN THE SEA ICE

By MORTEN P. PORSILD

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FIG. 1—Over 200 narwhals' tusks planted in the snow at Godhavn. They were obtained from the two savssats in the winter of 1914-15.

On the west coast of Greenland, at the 69th parallel, is situated Disko Bay, to the north of which lies the large island of Disko. Aligned across the mouth of the bay are several groups of islands, formerly called Whale Islands, in the modern Danish charts named Hunde Öer (the southern group) and Kronprinsens Öer (the northern group).

ICE CONDITIONS IN DISKO BAY

In summer the surface temperature of the waters of Disko Bay is considerably higher than that of the adjacent open sea in spite of the fact that two of the largest and most productive ice fiords, those of Jakobshavn and Torsukatak, there discharge large numbers of great icebergs. In winter, however, the bay is ice-covered as a rule and sometimes the covering lasts for months.

Normally the ice covering of most of the fiords and open bays of west Greenland begins to form at the head of the fiords, where the glaciers and glacier rivers debouch, and thence gradually approaches the open sea. In Disko Bay, on the contrary, the phenomenon often is reversed; the ice covering begins when the drifting ice of Baffin Bay, the so-called "west ice," has approached the coast, an event which ordinarily takes place during the last days of December.

The weather at this time of the year is apt to be rough and stormy; but after the approach of the west ice it becomes quiet; intense cold sets in;

the sky gradually clears, and the ice now grows rapidly from the island groups inward.

ICEBOUND NARWHALS

Then it often happens that schools of white whales or narwhals are cut off from the still open parts of Baffin Bay and are gradually driven in towards the head of Disko Bay. Freezing continues, and finally the schools

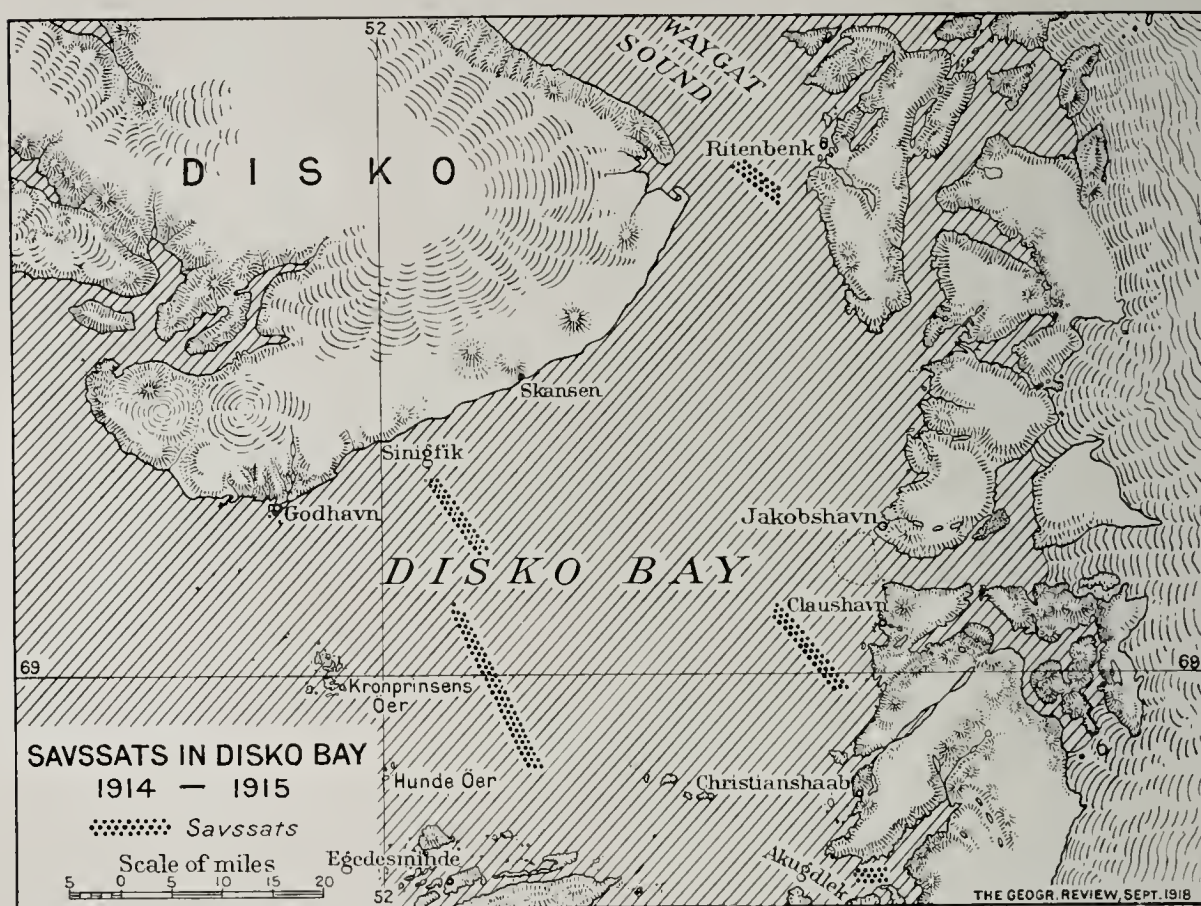


FIG. 2.—Map of Disko Bay showing *savssats*. The map has been traced from the author's copy from the Royal Danish Admiralty's chart of West Greenland. Scale 1:1,600,000.

are restricted to the last smaller or larger open spaces in the ice, whence they cannot escape unless the weather changes and the ice is broken. If no such change occurs a large school of whales may eventually find itself enclosed in a very small pool. When the temperature of the air is below -20° to -25° C., condensing vapors, visible at long distances, rise from every hole or every tidal crack. If a school of whales be inclosed in one of these pools the breath of the animals will expand the thin cloud to a substantial column and thus the inclosed animals may be easily detected, even from a distance, and they then become an easy prey for the inhabitants of the neighboring shores.

Although this phenomenon has been known for over 200 years and is by no means rare, it has never been described in literature from first-hand information; previous accounts have all been based on second or third-hand narratives. As I have had the good fortune to witness the behavior of

some extraordinarily large schools of narwhals thus caught in the ice, a little more detailed description of this peculiar phenomenon may perhaps be of interest.

EARLIER ACCOUNTS OF "SAVSSATS"

The natives of Greenland have an Eskimo term, *savssat* (pronounced s'set), meaning something like "crowding" or "overcrowding" and used of living creatures crowded in large numbers into a small space. To the best of my knowledge, the *savssats* of Disko Bay are first mentioned by Paul Egede, eldest son and successor of the first missionary in Greenland, in his accounts of Greenland written from diaries kept from 1721 to 1788.¹ Since his time they have been mentioned by C. L. Giesecke,² H. Rink,³ R. Brown,⁴ E. Vanhöffen,⁵ H. Winge,⁶ and perhaps others. Lastly, I have published⁷ a drawing by a native hunter and catechist, G. Kleist of Godhavn, showing the typical form of a *savssat* (see Fig. 5); and during the winter of 1914-15, I twice witnessed another form of *savssat*, heretofore not described, of which a record in Danish has been published.⁸ The present paper is a somewhat elaborated translation of a part of the last-named publication.

THE SEVERE WINTER OF 1914-15

The winter of 1914-15 was so extraordinary that even the old people do not remember its like. Severe cold set in with the new year, and the weather remained practically unchanged until late in April. The ice covering that developed was exceptionally heavy. From the middle of February to the last of March the ice was unbroken, at least from the 68th parallel (and perhaps farther south) to Etah on Smith Sound, 78° 20' N. How far from the coast the unbroken ice extended at its maximum cannot be stated. To the west of Disko Island the firm ice, even in good years, seldom ranges more than six to eight miles and lasts ordinarily only for a very short time. But this winter, from heights of 3,000 feet on the west coast not the slightest indications of water could be discerned. The ice covering began to form at the outer termination of Disko Bay, from

¹ Paul Egede: *Efterretninger om Grønland, uddragne af en Journal, holden fra 1721-1788*, Copenhagen 1788. German edit., *ibid.*, 1790.

² C. L. Giesecke: *Bericht einer mineralogischen Reise in Grønland (1806-13)*, Copenhagen, 1878. 2nd and complete edit. in *Meddelelser om Grønland*, Vol. 35, *ibid.*, 1910, pp. 1-478.

³ H. Rink: *Grønland geographisk og statistisk beskrevet* I, II, Copenhagen, 1852-57. English trans.: *Danish Greenland: Its People and Its Products*, Robert Brown, edit., London, 1877.

⁴ Robert Brown: *On the History and Geographical Relations of the Cetacea Frequenting Davis Strait and Baffin's Bay*, *Proc. Zool. Soc.*, No. 35, 1868, pp. 533-556. Reprinted in T. R. Jones, edit.: *Manual of the Natural History, Geology, and Physics of Greenland and the Neighbouring Regions*, London, 1875, pp. 69-93.

⁵ E. Vanhöffen: *Die Fauna und Flora Grønlands. Grønland-Expedition der Gesellschaft der Erkunde zu Berlin, II*, Berlin, 1897.

⁶ Herluf Winge: *Grønlands Pattedyr*, *Meddelelser om Grønland*, Vol. 21, 1902, pp. 319-521.

⁷ M. P. Porsild: *Studies on the Material Culture of the Eskimo in West Greenland (Arbejder fra den Danske Arktiske Station paa Disko, No. 7)*, *Meddelelser om Grønland*, Vol. 51, 1915, pp. 111-250.

⁸ *Idem*: *Om nogle vestgrønlandske Pattedyr og Fugle, I, II (Arbejder fra den Danske Arktiske Station paa Disko, No. 10)*, *Meddelelser om Grønland*, Vol. 56, 1916.

South Disko to the mainland at Egedesminde; the inner parts of the bay, about the colony of Ritenbenk and the southern part of the Waygat Sound, were closed early in February.

DISCOVERY OF TWO "SAVSSATS"

At Godhavn, the chief trading post on Disko, and more especially at Skansen, a smaller station on south Disko some thirty miles east of Godhavn every one was certain that a *savssat* would occur unless the weather changed. Every day sledges went out eagerly searching, and finally, on the evening of February 10, Ludvig Geisler, the most clever and experienced hunter of the region, actually found a *savssat*. On his way home he met a sledge from Godhavn, which brought the news to that place late in the evening, and a few hours after midnight every one from Godhavn went out to the *savssat* with all the dogs and sledges the settlement afforded.

We followed the ordinary track along the shore to Sinigfik, nearly midway between Godhavn and Skansen, thence about six miles in a south-southeasterly direction, and came to a belt of ice some 200 yards broad and about 6 miles long that had been frozen one day later than the surrounding area. This belt was not much thinner than the ice in general; but whereas the surrounding ice had a thin covering of snow on its surface, this field was studded only by the ordinary crystallizations always found on young sea ice and was thus far more transparent than the older sheet. There were no natural openings at all in it, but the school of narwhals finding this transparent belt assisted themselves by breaking open a number of holes, extending throughout the whole distance of the field (Figs. 3 and 4).

The natives took their position astride or close to the holes over the entire area. Every time a herd of narwhals appeared, they shot one or two and tied them to the ice or took them up and began flensing immediately. As the daylight lasted only a short time the slaughter had to be abandoned early. Towards evening the animals appeared to have avoided holes with blood until all holes were equally bloody. The next morning only a few live individuals were seen here.

Early in the proceedings Geisler had had the impression that the number of animals frequenting the *savssat* was far greater and that many had left the place frightened by the slaughter. As soon therefore as he had taken home the products of his kill, he went out in search of the next *savssat* and succeeded in finding it on February 19. As I was not at home and did not see that *savssat* until after my return on the 25th, when I visited the place a number of times, I have supplemented my observations with data collected by Mr. A. Bistrup, the chief factor of the colony of Godhavn.

The new *savssat* was of the same type as the former. This time the

series of holes extended over a distance of about twelve miles. The position of the northern end of the series I determined to be at $69^{\circ} 3.2' N.$, $52^{\circ} 36' W.$, its main direction being north-northwest to south-southeast, east of Kronprinsens Öer. This school was far more numerous than the first, and moreover we got the impression that every day brought new herds. They were apparently coming from great distances, were nervous, fatigued, and suffering from dyspnoea. At earlier *savssats* the Eskimos have had similar



FIG. 3—The northern end of the small *savssat* of Febr. 11th, 1915. To the right, towards the older ice is seen the border of the transparent icefield. Along the line of broken breathing holes are men occupied in flensing. In the background is the shore of Disko Island.

experiences, so that newcomers are confidently awaited as long as the weather conditions remain undisturbed. The fact that living animals were found at the holes on March 1 and 3, and probably still later, after several days had elapsed on which no live ones had been observed at all, seems to prove that they often come from great distances.

METHOD OF KILLING THE NARWHALS

At the first *savssat* about seventy animals were secured. Here were only people from Godhavn and Skansen, most of whom were experienced in that form of hunting and knew how to proceed systematically, so that there was no competition amongst them. Every man placed himself astride a hole with his rifle loaded, awaited calmly the arrival of a school, shot one of the animals—if possible a male with tusk—and harpooned it immediately after the shot; or, if he were exceptionally clever, he simply seized the animal by its nostrils or by one of the flippers. He then enlarged the hole, pulled his prey up, and proceeded with the flensing. It is imperative that the animal be cut up while yet retaining its bodily heat, for should the carcass grow cold before being drawn up on the ice it would quickly freeze



FIG. 4—Men occupied in flensing. The hole has been enlarged for dragging the narwhal onto the ice. In it floats another dead narwhal. To the right is a hole broken by narwhals, with cakes of ice lying about it.

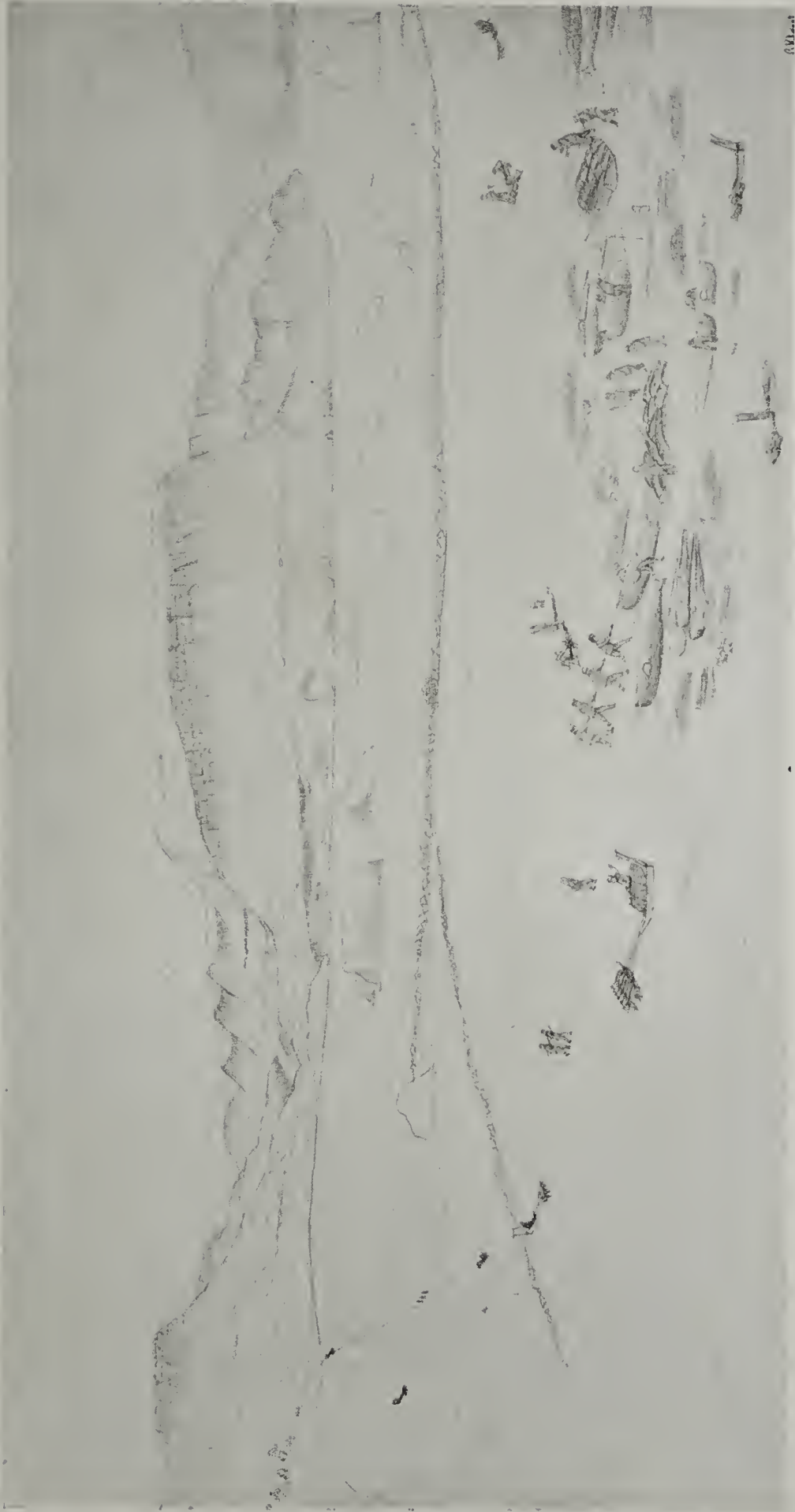


FIG. 5—A *saussat* off Godhavn, West Greenland. Narwhals are crowded together in the ice. Some people are securing right of possession by thrusting harpoons into them; others are drawing them up and driving the blubber home on sledges. In the background, to the right, sledges are coming from the settlement at Skansen. From a drawing by the native Greenland hunter and catechist, G. Kleist. The original reproduction may be found in the author's paper mentioned in footnote 7.

so hard in the extremely cold air that saws and axes alone could effect the cutting.

When the school had run out the whole line, it would turn and come back; each hunter, apprised of its coming by the shooting of those before him, would in turn deliver his shot as before. By this procedure the cleverest and coolest of the hunters got up to seven animals a day without leaving the spot first chosen. Others, less experienced, were not so methodical; running bewildered from one hole to another, they got as a rule nothing of their own, but had at last to content themselves with assisting others in dragging up their prey. Some, lacking all experience and self-control, shot as soon as an animal came to the surface and succeeded only in piercing the cushion on the forehead, after which the harpooned animal could not be held or it would sink stupefied but not killed. The experienced hunters waited till the narwhal had blown, again breathed, and was in the act of turning downwards. The bullet then proved fatal every time, piercing the brain or the back of the head. According to the observations of Mr. Bistrup and myself and estimates made by experienced Eskimos of my acquaintance the number of animals killed at this *savssat* was between two and three hundred.

SCENES OF CONFUSION

Rumors and news spread very fast in western Greenland, especially during winter, and after the second *savssat* had been found people came from nearly every inhabited place between the 68th and the 72nd parallels and from even further south. Some were over six days on the trail and had to cross the Nugsuak Peninsula with its two mountain ranges over 3,000 feet high. The settlement nearest to the *savssat*, Kronprinsens Ær, was the last of all to get the news.

According to narratives of persons who saw the first and worst days of the second *savssat*, a state of total anarchy prevailed. Those who came from a distance had not had much experience in these operations; there was constant confusion about the holes over the whole twelve-mile line. Consequently skillful hunters did things they otherwise would not have done; for instance, one young hunter killed on one day five large males, took merely the tusks, and let the carcasses sink. His profit for that day's work amounted to five months' wages of a day laborer in Greenland! At last people began to rob each other. Dogs starved from the long journey without rest, gnawed through their traces, and ran about loose and uncontrolled on the killing place; some were stolen and carried off; and only the deep-rooted Eskimo good nature and good behavior prevented serious trouble. The Greenlanders have a sort of self-government in their village councils, but neither the councils nor the Danish officials could maintain any order at this *savssat*. It is, and always has been, one of the principles of the Danish administration of Greenland not to interfere with Eskimo unwritten rules of hunting

and division of the spoil, rules which are handed down from one generation to another.

THE PROFITS

During the first days of the second *savssat* a far greater number of narwhals were thus killed than were secured, for most of them sank. On April 7 I traveled over the whole field of slaughter and counted on the ice over 200 carcasses. Assuming that the ratio of animals secured to animals killed was the same at the second *savssat* as at the first—though in reality the proportion lost was much greater at the second—we may conclude that over 1,000 animals were killed at the two *savssats* together.

And what was the ultimate gain of this unusual winter with its unusual *savssat*? For most of the people a rather negative one, as in such a season there is always the disadvantage of too much ice for successful sealing. At the two nearest settlements, Godhavn and Skansen, the people got plenty of hide—to the Eskimo the most palatable and desirable portion of a whale; they had plenty of meat; and from the sale of the blubber and tusks they deposited fair sums in the savings banks. But for people coming from afar, the profits were reduced to some hide, or at most a tusk, that would be converted into European luxuries at their own trading stations.

A HUMAN "SAVSSAT"

At Skansen, the nearest settlement on the way to the *savssat*, the people also participated in another and less pleasant kind of *savssat*. When I passed the place homeward bound, on February 25, the eight houses were overcrowded with foreign invaders never before seen here. They came worn out, lacking food and sleep, without dog food, without money—though in fact money was useless and undesirable because every inhabitant of the place was interested in keeping the contents of his own small store for himself and his fellow-villagers. This was particularly the case because the war in Europe, news of which had come to Greenland without definite reports as to its extent or the possibilities of Denmark's being involved, necessitated the utmost precaution in conserving as long as possible the limited supplies held in the stores. The men from Skansen came home late in the night, hungry and tired from their work and from a heavy sledge trip of five or six hours, slept a few hours, and went out again over the same way. In their houses they literally had to wade over the floors covered with sleeping intruders; while in front of the houses some three hundred greedy, masterless dogs ran about, storming the cached meat and hides, skins, rawhide thongs, whips, garments, boots, and all else eatable and constantly fighting with one another or with angry, scolding women and children.

When I passed the line of carcasses in April, it seemed to me that all the ravens of Greenland had assembled there. They rose in clouds. Some

days afterward the weather finally changed, and a part of the ice went out carrying off the carcasses. But as late as May 15, I saw large ice fields with carcasses driving slowly out of the bay, and the people of Kronprinsens Öer were now busied in securing dead narwhals that had reappeared.

SMALLER "SAVSSATS"

In addition to the *savssats* here described a small *savssat* of white whales occurred near the settlement of Akugdlek on January 8, yielding but half a dozen animals. According to records kindly sent by Mr. C. E. Lembeke-Otto, chief factor of the colony of Christianshaab, a *savssat* of narwhals was found on March 15 south of Claushavn. By people from the various settlements in this district some 130 animals were captured, of which 77 specimens had tusks. In addition some animals were killed by people of other districts, who delivered their products to their own trading posts. The *savssat* lasted about one week, when the ice became so badly tideworn that hunting was dangerous and had to be abandoned.

Finally in April a *savssat* of white whales near the colony of Ritenbenk yielded over 25 animals.

The following year there was a bad winter with not much ice. At nearly all neighboring settlements a larger number of sharks (*Somniosus microcephalus*) were observed than is usual, the capture of which is an important source of revenue to the natives. This increase in numbers was undoubtedly due to the abundance of food they had obtained from the *savssats*, to which they had been attracted during the year.

BIRD "SAVSSATS"

Sometimes sea fowl are surprised by sudden freezing of the sea. Eider ducks are often seen at the beginning of the winter crowded in hundreds in relatively small openings, but they always seem to be able to escape. Not so fortunate are various species of the Alcidae, viz. the black guillemot (*Cepphus grylle*), the little auk (*Mergulus alle*), and especially Brünnich's guillemot (*Uria arra*). Flocks of thousands of the latter species are not infrequently seen crowded in small openings. If such a guillemot *savssat* occurs near the shore, the birds are all captured. They are almost indifferent to their fate, as if they realized the futility of attempted escape. They only swim unquietly about and as a rule do not try to leave the hole.

If the hole be far from any settlement the whole flock gradually perishes here in the freezing. I saw such a case during the winter of 1908-09 near the Kronprinsens Öer. The opening here had originally had a diameter of over a mile; when I passed, the whole field was covered with ice, rather thin but safe enough for sledging. Over it could be seen elliptical humps of ice, some of them with a small fissure at the top, through which heads of birds protruded. A few birds could still withdraw their heads, dive for a few moments and return. Others could not withdraw the head, the

opening being narrowed to a mere fissure in which the head moved restlessly and without meaning, the water continually welling over through the fissure. By far the most had succumbed. Over the solid frozen humps rose their small black heads with closed eyes and beaks pointing straight upwards.

On one occasion sledges on the track over the Waygat between Ritenbenk and Disko met flocks of the little auk flying over the ice-covered sea.

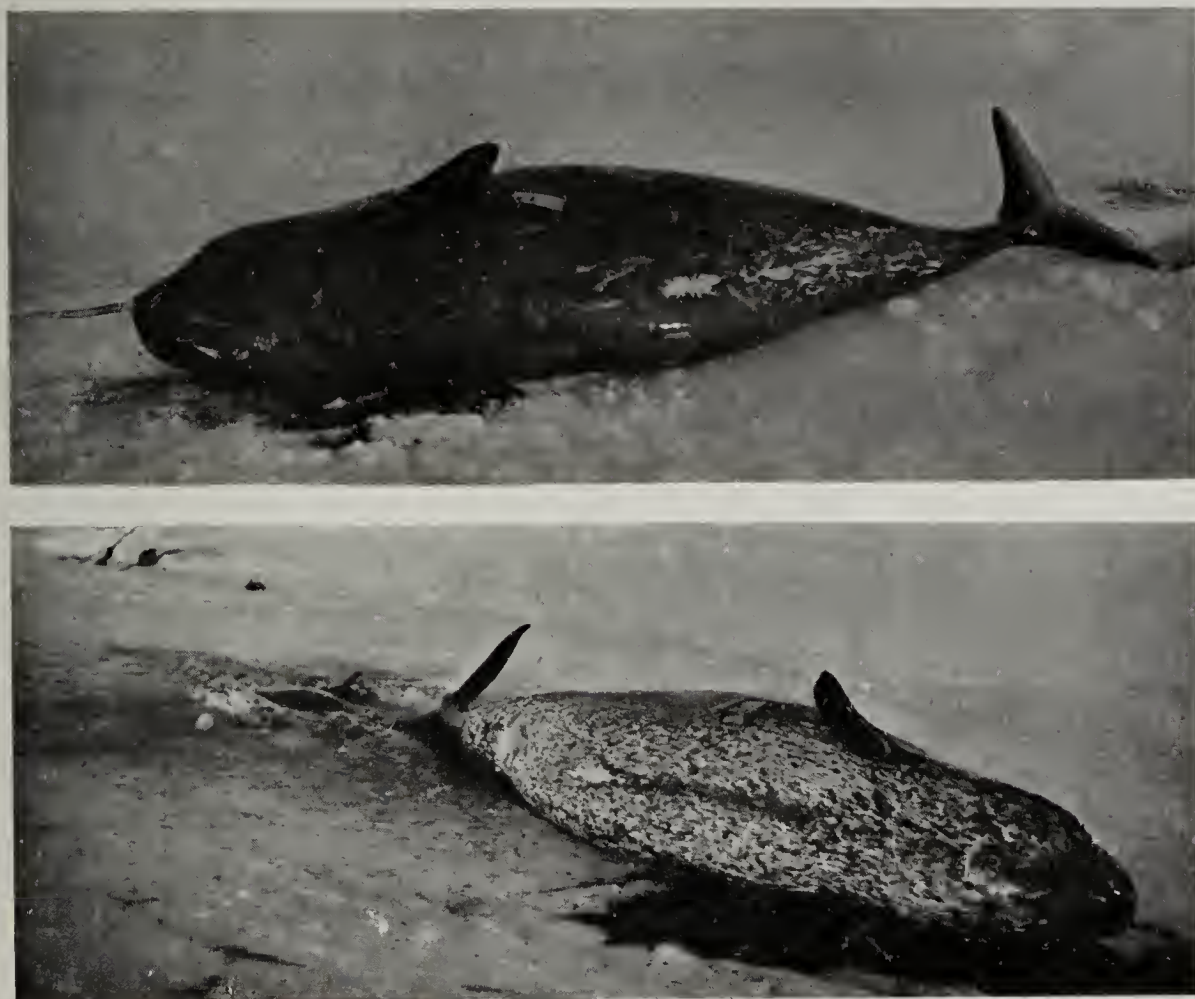


FIG. 6—Above a young male narwhal, ventral side. The small tusk is visible. Below a female narwhal of nearly the same size, ventral side. The lighter coloring of the female is apparent. Behind the female is a hole still undisturbed by the hunters, with a dead narwhal floating in it.

When the birds met the sledges, they fell in showers over them and the dogs. The Eskimos think that they become snow-blind in flying great distances over ice and that they then fall on every dark thing, supposing it to be an opening in the ice. When some days later I drove the same way, I saw no live birds, but along the whole route I saw scattered dead specimens, not yet eaten by sledge-dogs or by ravens.

It is a common tale among Greenlanders that the black guillemot sometimes winter under the ice, having a sort of chamber of snow on the surface of the ice above a small diving hole, like the birth chamber of the ringed seal. I never saw such cases, and although I have heard the story told in

the same manner from various parts of Greenland, I think that it can relate only to birds worn out in a snowstorm and frozen as in the instance of Brünnich's guillemot described above. I cannot understand that it is possible for any bird to keep its opening from freezing a longer time, even when it is burrowed under a layer of snow.

THE BREAKING OF BREATHING HOLES BY NARWHALS

The ability of the whale to break breathing holes in the ice is a somewhat obscure point. At the first *savssat* I visited the holes, when first seen, were

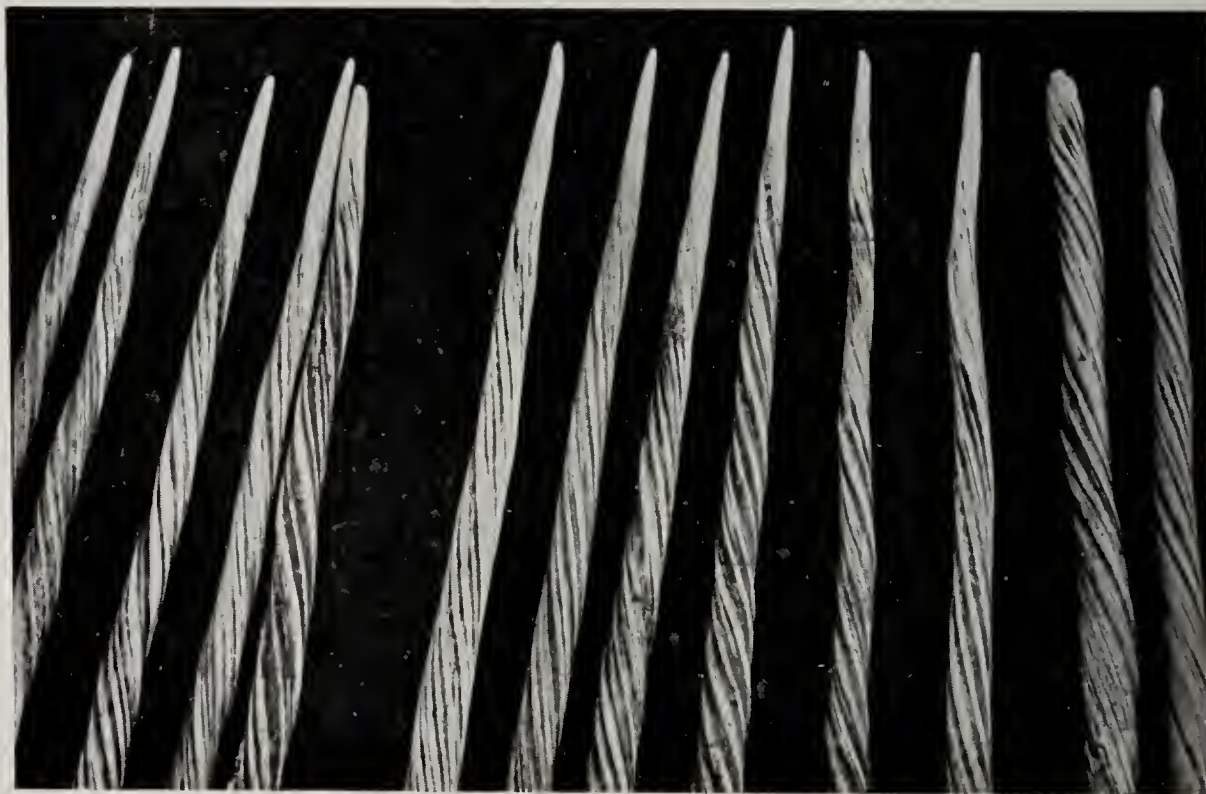


FIG. 7—Points of 13 large tusks. The worn and polished white points, and the spiral grooves dark from algal growth, are clearly defined.

several feet long and from one to three feet broad. By lengthening and merging into each other, the holes first broken developed to cracks from six to eight yards in length. They formed a series distributed as groups of parallel openings, separated by intervals of ice intact for distances varying from fifty to a hundred yards (Figs. 3 and 4). Under the whole field of transparent ice small groups of the narwhal school, numbering from six to twenty animals, were constantly swimming to and fro, emerging now and then at the holes for breathing. It appeared to me that one of the foremost in the flock determined when the emergence should take place, the others following eagerly and crowding into the holes. At every emergence a dull rumble came from under the ice about the hole as if large tennis balls had been thrown with great force from beneath up against the ice, and the ice we stood upon trembled considerably. I did not actually see new holes broken open, but I think I saw some holes enlarged. To be sure of this was

not easy, for with every emergence a great volume of water poured up through the hole. Since the cold was intense, about 30 degrees (centigrade) of frost, the water froze nearly instantly, and finally the holes became situated in the top of elongated ridges.

During the following days, the holes gradually narrowed by freezing. I once saw a hole used for breathing narrowed to a very small fissure without new breaking. Finally all holes of the first *savssat*, and most of the second, froze solid whilst other larger holes were made by the hunters for dragging up the carcasses. Towards the middle of March the ice had grown so thick that I do not think the narwhals were able to break it. At this time I noticed animals emerging for breathing in holes full of blood and flensing offal.

USE OF THE NARWHAL'S TUSK

The ice cakes broken by narwhals at the first *savssat* were about three inches thick, but at the second I measured some of six to seven inches in thickness (Fig. 4). Among the various conjectures made as to the probable use the male narwhal makes of his tusk, the view has been advanced and has found its way into textbooks of zoölogy that it is used to pierce openings in the ice. This suggestion must however be abandoned as quite wrong. The holes are broken by blows with the thick and firm cushion on the upper side of the head, in front of the so-called blowing hole, the exit of the nostrils. Eskimos at Godhavn and Skansen, well acquainted with the habits of the narwhal in ice, declare positively that the male carefully guards his tusk from bumping into firm and tough ice. Once Ludvig Geisler from Skansen found a single very large male sleeping near a lead in very hummocky ice, its mighty tusk projecting out over the surface of the ice and leaning against it. The animal awoke before Geisler could get his rifle clear and very slowly and cautiously drew the tusk back until it was quite clear, when it rapidly dived away.

In the drawing of G. Kleist (Fig. 5) illustrating the most ordinary form of *savssats*, may be seen a number of male narwhals emerging from a very small hole with their tusks resting upon the surface of the ice. Here a natural opening in the ice has gradually been diminished by freezing, and the stronger males have pushed off the weaker ones and the females. Eventually they become so worn out that they remain constantly at the hole, resting their tusks on the ice.

HOLES MADE BY OTHER WHALES

Whales of other species are also able to break breathing holes in ice. With white whales (*Delphinapterus leucas*) it is as common as with narwhals. Some natives state that the holes broken by white whales are somewhat trapeziform in shape and are thus distinguishable from those of the narwhals. Others deny this.

Giesecke mentions in his diary a case where a harpooned northern right whale ran with the line under the ice and broke ice that was over a foot thick. Old hunters relate numerous cases of a similar kind. The hump-back whale (*Megaptera boöps*) has ordinarily left the waters of Disko Bay when the ice covering sets in. But sometimes it happens that a single straggler is delayed by the lure of unusually large schools of the polar cod (*Gadus saida*) and thus is surprised by the ice covering. It then breaks open large triangular or trapeziform holes.

THE GALAPAGOS ISLANDS*

By GEORGE McCUTCHEON McBRIDE

The Galapagos Islands, sometimes called "The Haunted Isles" (Las Islas Encantadas) and in 1892 officially renamed the "Archipiélago de Colón" in honor of Columbus, lie astride the equator, about 600 miles off the coast of Ecuador and 850 miles southwest of Panama.

DISCOVERY

They were discovered in 1535, twenty-two years after Balboa first sighted the waters of the South Sea and three years after Pizarro had overthrown the Inca Empire. Tomás de Berlanga, third bishop of Panama, was the discoverer. While sailing from the isthmus for the newly conquered Peru, he was becalmed and carried by ocean currents far out from shore. Short of water and with the supply of feed for the horses on board almost exhausted, the navigators landed on an island toward which the ocean drift had carried them. They found little water or forage but saw great numbers of large land turtles (Spanish, *galápagos*) big enough to carry a man on their backs.

NAMES

The discoverers gave no name to the islands; but, because of the abundance of turtles found by subsequent visitors, the group soon came to be known among the Spaniards as the Islands of the Galapagos. Such names as Santa Gertrudis, Tierra de Carlos IV, Quita Sueño (nightmare), etc., were given to the individual islands. The archipelago was entirely uninhabited when discovered and remained so for 300 years. During the sixteenth and seventeenth centuries it was a favorite rendezvous of the buccaneers, who found the islands conveniently situated as a base from which to raid the Spanish towns of the west coast and to which they could return for the division of the spoils. These adventurers gave names of their own to the different islands, calling them after personages prominent in English history of their time; Chatham, Albemarle, James (Stewart), Charles (Stewart), Narborough, etc. Both former sets of names have been replaced by the Ecuadorian government, which has rechristened the group, using names of those connected with the discovery of America. So we find in official publications that the islands are now styled San Cristóbal, Santa

* The suggestion for this article came from an account of a voyage to the Galapagos Islands made in 1906-07 by Señor don Nicolás G. Martínez, formerly of the Observatory of Quito, Ecuador. This account was first published in full in 1916 in 23 numbers of *El Telégrafo* of Quito, two extracts having appeared previously in *La Prensa* of Ambato, Ecuador, in 1911 and 1913 respectively. Dr. John Kunst of Chicago, Ill., made a translation of the entire account and sent it with the translation to the Editor of the *Review*. It has been used in part as the basis for the present study.

María, Pinta, Pinzón, Isabela, Fernandina, etc. The English names, however, have persisted, and by them the islands are most widely known.

EARLY HISTORY

The first official exploration of the Galapagos was undertaken in 1793 by Alonzo de Torres of the Royal Spanish fleet. After a hasty visit to the islands, lasting only a few days, a map of the group was made.¹ As the Galapagos lay far off the routes followed by ships sailing the Pacific they were of little interest until the beginning of the nineteenth century. At that time citizens of the United States brought them to the fore. American whalers, having largely exhausted the Atlantic Ocean grounds, began to voyage farther in search of hunting fields. This was the period when the presence of their rich cargoes in the Falkland Islands offered a tempting opportunity to tax them, and it was only after an American man-of-war had destroyed the customhouse there that the attempt was given over. About this time the whalers began to round Cape Horn. Ports of Chile and Peru were now frequented by American whalers. Their harbors, where to-day the Stars and Stripes are seldom seen, were often filled with schooners carrying the American flag. These Pacific Ocean whale hunters found the Galapagos Islands a convenient gathering place. Sperm whales were abundant in the vicinity, and on these uninhabited islands food and fuel could be secured with little trouble. One of the harbors on the Island of Charles where drinking water (very scarce on most of the islands, entirely lacking on some) was found, still bears the name then given it, of Post Office Bay. There the whalers had arranged a place in which to deposit letters brought by vessels recently arrived or from which homeward bound ships could collect any mail left.

AS POSSESSIONS OF ECUADOR

In 1831 an Ecuadorian, Gen. José Villamil, after investigating conditions in the islands, called the attention of his government to them, and the following year, apparently for the sake of securing revenue from the whalers or because of a fear lest an unclaimed group of islands which were assuming such importance might pass into foreign hands, Ecuador sent out a small expedition under Col. Ignacio Hernández, who, on February 12, called together the crews of the whaling ships then at the Island of Charles and in their presence formally took possession of the archipelago in the name of his government. A little colony was established near the harbor. A few acres were tilled though trade with the American whaling men was the main support of the colonists, who, in 1837, numbered some 200 or 300 people.

But the island soon was made a penal settlement, a step which destroyed all hopes of prosperous development; and by 1854, when Ameri-

¹ See J. A. Bognoly and J. M. Espinosa: *Las Islas Encantadas*, Guayaquil, 1905.

can whale fishing began to decline, the tiny colony had been reduced to a few members and extreme poverty. Distance from the seat of government, too, had made administration difficult. There had been frequent revolts. Two governors had been assassinated and one driven from the islands. Consequently when, in 1852, Great Britain proposed to accept the islands in lieu of a debt due from the Ecuadorean government there was little opposition in Quito. But Peru, France, and Spain protested against this

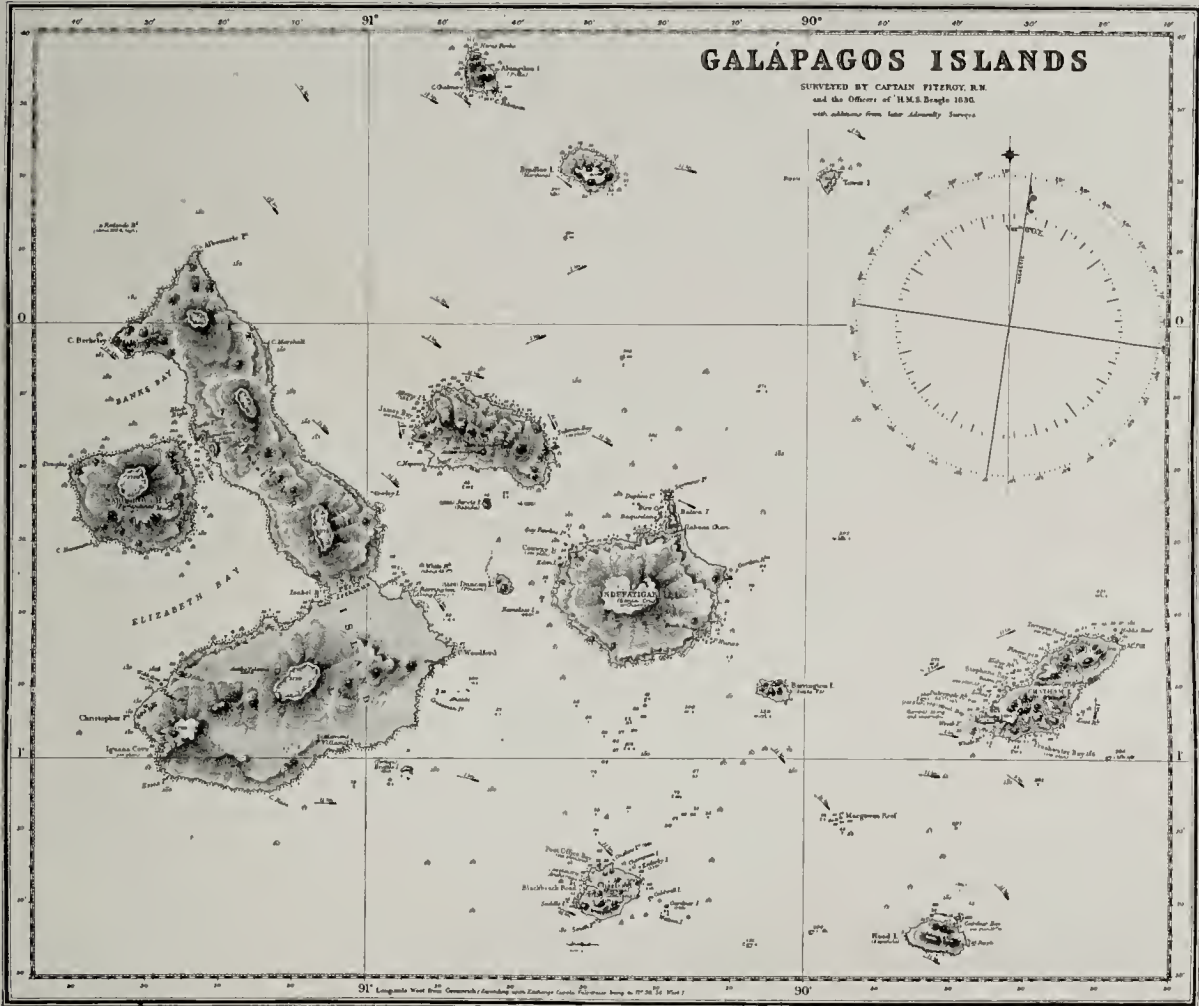


FIG. 1—Galapagos Islands: from the British Admiralty Chart, No. 1375, published 1886. Scale of this reduction 1:2,650,000.

transfer and negotiations came to nought. Just at this time an American whaling crew which had put into Post Office Bay were captured by the convicts and their ship employed as a means of escape to the mainland. The United States, in exacting damages in behalf of its aggrieved citizens, made an effort (1854) to secure a concession for the exploitation of the guano said to abound on some of the islands. This time England joined with the former obstructionists in blocking proceedings.

Once more, in 1858, the Ecuadorean government was said to have planned the lease of the islands to the United States in consideration of a loan of several millions of dollars. If such a project was considered it came to

nothing and the islands continued undeveloped and almost uninhabited. Former colonists had left many domestic animals which had grown wild and had increased rapidly. Drovers of cattle, dogs, cats, pigs, and donkeys existed where the colonies had been, while flocks of goats occupied some of the lesser islands. Of later efforts at colonization none have succeeded except those now on Chatham and Albemarle. Recent unsuccessful attempts have been made by North American interests to secure concessions for the development of the natural resources, but the Ecuadorian government apparently fears that its hold on these distant possessions is too feeble to sustain the centrifugal influence of foreign colonists.

VISITS OF SCIENTISTS

The greatest interest in the Galapagos, however, attaches not to their history, but to the peculiarities of their geologic structure, their climate, and the unique place biologically which the group occupies. These have been the objects of attention by scientists from many lands and on repeated occasions. In 1835 when the *Beagle* visited the islands, the young scientist, Darwin, made a study of their natural history that has formed the basis of all subsequent work.² The Swedish botanist, N. J. Anderson, spent a few days on the islands in 1852. Later Dr. Habel, the scientists of the Hassler expedition under the direction of Louis Agassiz, Theodor Wolf³ (as government geologist of Ecuador), Alexander Agassiz (as leader of the *Albatross* expedition), and others have investigated various phases of the natural history of the islands. The published results of these studies⁴ and the accounts written by the buccaneers constitute almost the entire source of information regarding this peculiar group of islands.

² Narrative of the Surveying Voyages of H.M.S. Adventure and Beagle, 3 vols., London, 1839; reference in Vol. 2, pp. 484-505. Sir J. D. Hooker's work on the flora of the archipelago, based on Darwin's collections first drew scientific attention to its peculiar character (see B. L. Robinson, work cited in footnote 4, pp. 77, 81-82).

³ Teodoro Wolf: Geografía y Geología del Ecuador, Leipzig, 1892, pp. 469-493; *idem*: Die Galápagos-Inseln, *Verhandlungen der Gesell. für Erdkunde zu Berlin*, Vol. 22, 1895, pp. 246-265.

⁴ The more recent of these include:

Alexander Agassiz: General Sketch of the Expedition of the "Albatross" from February to May, 1891, *Bull. Museum Comp. Zool.*, Vol. 23, 1892, pp. 1-89, Cambridge, Mass.

George Baur: On the Origin of the Galapagos, *Amer. Naturalist*, Vol. 25, 1891, pp. 217-229; 307-326; *idem*: New Observations on the Origin of the Galapagos Islands, with Remarks on the Geological Age of the Pacific Ocean, *ibid.*, Vol. 31, 1897, pp. 661-680; 864-896.

Edmund Heller: Mammals of the Galapagos Archipelago, *Proc. California Acad. Sci.*, 3d Ser., Zoölogy, Vol. 3, 1904, pp. 233-250.

A. L. Kroeber: Floral Relations among the Galapagos Islands, *Univ. of California Publs. in Botany*, Vol. 6, 1916, No. 9, pp. 199-220.

Robert Ridgway: Birds of the Galapagos Archipelago, *Proc. U. S. Natl. Museum*, Vol. 19, 1897, pp. 459-670.

B. L. Robinson: Flora of the Galapagos Islands, *Proc. Amer. Acad. of Arts and Sci.*, Vol. 38, 1902, pp. 77-269.

Alban Stewart: A Botanical Survey of the Galapagos Islands, *Proc. California Acad. Sci.*, 4th Ser., Vol. 1, 1911, pp. 7-283; *idem*: Further Observations on the Origin of the Galapagos Islands, *Plant World*, Vol. 18, 1915, pp. 192-200.

See also the chapter on the Galapagos Islands in R. F. Sechart: *Distribution and Origin of Life in America*, New York, 1912, pp. 295-335.

VOLCANIC CHARACTER

The Galapagos Archipelago is composed of ten principal islands with many smaller ones. The largest, Albemarle (Santa Gertrudis of the Spaniards, Isabela of the Ecuadorians), measures about 75 miles in greatest length by 15 in maximum width. Some of the smaller ones are mere rocky points projecting above the surface of the water. Wolf estimates the space over which the islands are scattered as some 18,000 square miles and their combined area is a little over 2,000 square miles. There is a striking similarity in the appearance of the larger members of the group. Each island is composed of one or more central cones from which the land slopes gently to the water's edge except on the southeast side where the ocean waves, breaking constantly against the shore, have worn it back into abrupt cliffs. The summits of the islands vary in height from 1,000 to nearly 5,000 feet. Seen from a distance these higher points rise as if from separate bases, the low connecting flats appearing only on near approach. Scattered over the sloping plains from the shore to near the inland summits rise thousands of jagged secondary peaks, roughly conical hillocks, that impart a strange appearance to the landscape. The whole group is volcanic. Darwin believed that the islands were entirely oceanic in origin and that each had risen separately. This theory, supported by Wallace and Agassiz, was undisputed for many years; but Baur's study of the biology of the islands led him to the conclusion that they had formerly been joined together and at a still earlier period had been connected with the American continent.⁵ The survey of the ocean topography between Central America and the Galapagos carried out by the *Albatross* expedition in 1885-91 showed the islands to be the highest points of a submarine elevation, more or less circular in form, sloping up very gradually from 1,000 fathoms below the surface. This elevation in turn is the summit of an immense submerged plateau that extends northward past Cocos Island almost to the Isthmus of Panama.⁶

The entire surface of the islands is covered with lava and volcanic ash ejected from craters in the central and secondary cones. Colnett, who visited them in 1794, speaks of Albemarle and Abingdon as "one entire clinker."⁷ Over the lower lands the lava shows little effect of weathering; the plains are covered with brittle fragments; and the surface is crossed at intervals by huge streams of glassy blocks of obsidian as fresh as if just cooled. As animals cross these fields or pick their way among the knife-like edges of broken rock their hoof beats resound as on a metal pavement. On the upper slopes the lava is badly decomposed, forming a rich, though shallow, soil.

⁵ See the discussions of the problem in the several works referred to in footnote 4.

⁶ Alexander Agassiz: Work cited in footnote 4, pp. 9-11.

⁷ James Colnett: *A Voyage to the South Atlantic and round Cape Horn* London, 1798; reference on p. 143.

ERUPTIONS

There have been several eruptions recorded since the time the islands were discovered. In 1814, again in 1825, and again ten years later volcanic activity was noted in some of the western islands. In 1897 a new crater, on James Island, broke into violent activity, pouring enormous streams of lava down the mountain side. At times a glow may still be seen reflected from the opening made on that occasion. Though there has been no eruption observed on Albemarle for many years, the crater of Santo Tomás, one of its largest cones, contains many vents from which are constantly issuing jets of steam and gas. Other islands are deeply covered with flows of recent date. Wolf asserts that even the base of the islands is composed of an old volcanic tufa. Though sandstone had been reported along some of the coasts Alexander Agassiz determined this to be only decomposed fragments of coral cemented into rock. Coralline limestone is seen in places on the beach though no reefs are present nor do corals thrive in the surrounding waters, which are too cool to favor their existence. Deep sea dredgings have revealed an immense amount of silt that has been carried far out toward the Galapagos, an occurrence which also probably has served to check the growth of corals in this region.

PLANT AND ANIMAL LIFE

Conclusions regarding the origin of the islands are based as much upon the nature of the plant and animal life found there as upon the geologic structure of the group. To the traveler, unless fortunate enough to arrive during an unusually rainy season, the general aspect is weird beyond imagining.⁸ Save for a narrow belt of mangrove trees that in places fringe the shore there appears nothing but a broad reach of jagged volcanic rock, its barrenness broken only by solitary stalks of tall, forbidding cactus, or scattered clumps of stunted, ash-colored shrubs whose leaves have shrunk to desert thorns. The few varieties of animal life encountered in this desert zone are no less strange. Sun-bleached shells of giant turtles dot the plains; occasional living specimens may be seen feeding upon the succulent cactus stems. Birds of a limited number of species, so tame they may be caught in one's hands or knocked down with a stick, swarm like flies within the belt of mangrove trees or sweep over the black plains in search of insects. The most common animal is the lizard, the small familiar kinds that dart from crevice to crevice among the rocks, the larger land variety generally found in caves among the blocks of lava, or the great, hideous, sea iguanas, some three or four feet in length, notable as being the sole surviving species of marine saurians from a bygone age. The entire scene is typical of the storied desert island: a fitting site for pirates' rendezvous; well named "The Haunted Isles."

⁸ Agassiz (whose visit in 1891 occurred during a year of famous rains on the islands and the corresponding mainland) remarks the contrast between the then green appearance and the desolate aspect described by Darwin (*op. cit.*, p. 61).

THE INTERIOR REGION

Going inland, across the barren plains one encounters a region in striking contrast to the arid coastal lands. The ground rises gently toward the interior. At about 500 feet above sea level there occurs a sudden change of conditions. The desert gives way to a flourishing growth of vegetation. Only a narrow belt of larger but still leafless trees marks the transition to this upper zone. Here a thick growth of forest is encountered, composed of trees not large but having an exuberant foliage, while creepers cross from tree to tree, and the ground is overgrown with beautiful ferns.

Above this forest belt and reaching, on some of the islands, to the extreme summits of the rounded cones extends a stretch of grasslands where herds of wild cattle and donkeys graze and fatten. Here too live giant galapagos, on islands where inroads of hunters have not exterminated them. The soil of these natural pastures is a clay, formed, as has been said, of lava decomposed by constant moisture and enriched with a deposit of humus that makes possible an abundant growth of grass; or, as on Albemarle, a surface bed of finely powdered pumice, which, though too porous to retain much water, has offered a foothold for the formation of a compact sod. Running water is scarce even upon these pasture lands; but the water table lies only a little below the surface, and drinking places have been excavated where the lay of the ground permits or where tiny springs emerge. To these drinking ponds the animals come from great distances. The cattle are able to go an unusually long time without taking water. The heavy mists that settle on the grass seem to supply their need. The turtles, also accustomed to drink but seldom, travel for miles to slake their thirst about the borders of the pools. With their slow pace they spend many days in reaching the water. After drinking their fill they lumber back to their wonted feeding grounds along the well-worn paths that radiate from each pond.

EFFECT OF ISOLATION ON ORGANIC LIFE

Of all the islands in the world none offers a better field to study the distribution of plant and animal life or the effect of an isolated environment upon organic forms. Of the 26 kinds of land birds described by Darwin all but one were peculiar to the Galapagos, while nearly 200 of the 400 species of plants that have been found are confined entirely to this group of islands. The great land turtles exist in no other place upon the globe. Here alone survives that strange saurian, the sea iguana to which reference has already been made. Only one species of native mammal has been found, a small rodent, likewise endemic, about the size of a rat. So distinct are both the fauna and the flora and so diverse on the different islands that they point to a long period of isolated development whatever the source from which they came.

PROBABLE ORIGIN OF FLORA AND FAUNA

The conclusions arrived at by Darwin and confirmed by Alexander Agassiz have been borne out in later research, that "its flora is eminently American, while its fauna at every point discloses its affinity to the Mexican, Central, or South American, and even West Indian types."⁹ In spite of the distance that separates them from the mainland the Galapagos Islands are well situated to receive contributions of plant and animal life from the continents. They lie at the meeting place of two ocean currents, both of which come directly from coasts that might contribute to this life. The Humboldt Current, during nine months of the year when the trades are blowing constantly, divides into two branches off the coast of Ecuador, the larger one veering westward towards the Galapagos. Its velocity is very great, sometimes as much as 75 miles a day; so that under favorable circumstances eight or ten days would suffice to carry drifting objects to the islands. From the northeast a warm current that has come down along the coast of Central America enters this same region. The meeting of the different streams produces what has been called "current doldrums," the current turning east or west, north or south, according to the direction of the wind. The fact that the current from the southeast is cold and that it flows along a desert coast where few streams enter the sea, while the northern current has a higher temperature and bathes a shore whose numerous torrents in the rainy season come laden with sediment, probably accounts for the greater resemblance of fauna and flora to those of Central America. The *Albatross* observers reported the ocean floor covered with decaying vegetable matter far out along this northern drift. This seems sufficient to explain the presence and the character of life upon the islands without presupposing a former actual land connection. Alban Stewart, after a year spent on the islands and a careful study of their flora, considers that the botanical evidence goes so far as to make a very positive argument against any former connection with the continent.

CLIMATE

The climate of the Galapagos is far from equatorial. The presence of cold water from the Humboldt Current reduces still farther the mild temperature to be expected in an oceanic climate. Darwin reported a temperature of 60° F. one foot below the surface on the southeast side of Albemarle, and Wolf records surface temperatures of 70° F. and 73° F. at several points between the islands. So marked is the effect of the cold current that, while the geographical equator passes directly through the group of islands the thermal equator lies some distance north, throughout many months departing over 20° of latitude from the geographical line.

⁹ Alexander Agassiz: *op. cit.*, p. 60.

This favors the development of strong southeast trades at the islands during most of the year. A further contributing influence to the cool temperature of the ocean in this region is probably found in the upwelling of cold water from the ocean depths.¹⁰ These factors combine to make the Galapagos cooler than any other equatorial land at so near sea level. Even on the lowlands the heat is modified, but the effect of air currents from off a cool water surface is most striking as one ascends the slopes toward the interior.

The zones of vegetation already noticed find their explanation in the varying meteorological conditions that exist at different levels. Both in temperature and moisture is this difference notable. Though continuous records are lacking, the observations made by scientists at different seasons of the year give a fairly accurate idea of the climate. While near sea level the temperature often rises to 90° F. (even higher in places sheltered from the wind), Wolf found a fall of one or two degrees for every hundred meters of ascent. Upon the middle slopes some 400 to 600 feet above the sea the average temperature was less than 70° F. On the summit of the hill of San Joaquín in Chatham Island at an elevation given as 2,330 feet, he recorded a mid-day temperature of 57.2° F. during heavy mist and a strong southeast wind. There is little variation from day to day and no marked seasonal difference. A passing cloud, or the presence of a fog, produces greater change of temperature than do the seasons, while the greatest range occurs from day to night. After sundown it becomes actually cold on the higher hills, and travelers who pass the nights there in the open air huddle about their camp fires even during the milder months of the year.

The northern islands lie more within the influence of the warmer ocean waters from the Gulf of Panama, those toward the south receiving the full effect of the cold Humboldt Current. The low temperature of the ocean waters has made possible the occurrence of some forms of life rarely found outside the higher latitudes. Several kinds of seals are common, among them *Otaria australis*, found also on the coast of Peru and Chile and about the islands of Tierra del Fuego. Penguins, whose range is generally restricted to the coast of subpolar regions, are here found directly upon the equator; and the great albatross so common about Cape Horn has followed the cold current towards the north, nesting by hundreds upon the island of Hood.

RAINFALL AND MOISTURE

In amount of moisture the zones of elevation are still more marked. The lower levels are almost rainless. During the first four months of the year some showers may fall, but completely rainless years are not unknown. The nature of the soil is such that any water which may fall immediately disappears beneath the rock-strewn surface. Some who have visited the

¹⁰ Cf. R. E. Coker: Ocean Temperatures off the Coast of Peru, *Geogr. Review*, Vol. 5, 1918, pp. 127-135.

islands in unusual seasons have been surprised to find the lower lands green with vegetation; but in normal years there is a very serious lack of moisture.

In contrast with the desert conditions characteristic of the slopes near the sea, the uplands are bountifully supplied with moisture. Besides a well-marked period of frequent convectional showers extending from February to May when the southeast trades are interrupted and equatorial ealms prevail, there is a so-called summer, approximately from June to January, when, though the tropical downpours have ceased, the hills are drenched in dense mists (*garúas*) sufficient to keep the roads filled with mud, make books and papers mold in a short time, and quickly rust unpainted iron. Light rains may fall here at any season. On the southeast side of the islands, as on corresponding slopes of the hills, the moist zone extends several hundred feet lower, while the northern exposures, sheltered from the rain-bearing winds, present a striking contrast in their relatively arid character. The effect of abundant moisture on the uplands is evident not only in the ranker growth of vegetation but even upon the lava flows that stretch from near the summits to the sea. The upper sections of these flows are often badly weathered and covered with plants that have found lodgment upon their surfaces, while the lower reaches, that cross the arid zone beneath, show little effect of atmospheric action but lie in solid blocks of black obsidian. But for the constant humidity on the highlands the soil itself would still resemble that of the desert lower grounds.

SETTLEMENTS

It is upon these high slopes that the few human settlements have been made. Only laborers required to handle cargoes live beside the landing places. On the island of Charles (Santa María of the Spaniards, Floreana of the Ecuadorians) Darwin found a penal colony occupied in the cultivation of corn, sugar cane, fruits, and many vegetables. The *hacienda* on Chatham island produces chiefly sugar, but its peon workmen raise also coffee, grains, and fruit. Hides and turtle oil, with sulphur from the crater of a volcano, form the principal products of the one estate on Albemarle. Its people are well supplied with beef or turtle meat and raise enough to provide for their own needs on the small patches of cultivated land. No other islands have been occupied. The lower ones possess no productive soils. There is estimated to be a total of about 200 square miles of land suitable for cultivation on all the islands. A somewhat greater area is available for pasture. The climate is found congenial by the Indians from the highlands of the Andes. They form the principal element in the population of Chatham, serving as peons upon its sugar estate. The only land occupied is held in these two large farms on Chatham and Albemarle. About them centers the entire life of the islands. Their respective owners

hold a monopoly of the trade; to them belong the only vessels plying between the islands and the mainland. Ecuadorian officials, desirous of seeing the islands peopled by their own citizens, propose to grant free land to prospective settlers, advancing funds sufficient to equip them with the necessary implements for farming.

PROSPECTS

The Galapagos are not likely to become a purely agricultural colony. The restricted area of tillable soil makes that improbable. Other resources, however, may be developed. The giant turtles will supply oil and meat for a few inhabitants for some time to come. Their flesh is tasty. Dampier said of them, "they are large and fat, and so sweet that no Pullet eats more pleasantly." For this very reason they are already extinct on Chatham and would not long survive the general settlement of the islands. Contrary to what has been supposed there is little guano worth exporting and no metals can be expected, considering the volcanic structure of the rock. But stock raising and exploitation of such resources as sulphur, orchilla (the lichen producing the dye orehil or arehil), and the marine life with which the ocean teems and which may be cured with the salt deposits of the islands, may supplement agriculture sufficiently to make a considerable population possible.

With the opening of the Panama Canal the islands gain an advantageous position. Their situation, once an obstacle to all progress, now becomes a valuable asset. Directly on the line of traffic from the Isthmus to New Zealand and Australia they offer an excellent site for coaling and provision stations.¹¹ Several well sheltered harbors on the western side of the islands are of easy access and afford good anchorage for vessels. While the currents are baffling and uncertain, no storms visit the group during any period of the year. The scarcity of water may be overcome. Though few surface streams have been discovered water can be found at little depth on the larger islands and some streams are known to enter the sea below the high tide level. Though it may be a consideration of little weight while they remain the property of Ecuador, the islands possess, too, great strategic importance because of their nearness to the world's new crossroads. In the hands of a naval power they would become of value as a base from which to guard the approaches to the Canal. But Ecuador seems reluctant to part with them and, in the hope of effecting their colonization and by maintaining closer intercourse with them, no doubt plans to profit from their enhanced importance along the coming lines of trade.

¹¹ Paul Walle: Les îles Galapagos et le canal de Panama, *Bull. Soc. de Géogr. Comm. de Paris*, Vol. 33, 1911, pp. 594-604.

THE REAL TEMPERATURES THROUGHOUT NORTH AND SOUTH AMERICA

By MARK JEFFERSON

What a suggestion of burning heat has the phrase "torrid zone" and how unwarranted! And how pleasing is the name "temperate" applied to our own zone! Well do we know the fierce heat of our summer hot spells, the bitter cold of our winter cold waves; well have we in mind the sudden rises and yet more sudden drops that characterize the temperatures in this zone that is temperate in name but so intemperate in fact that the only sound description of it that applies at all times is that every season is exceptional: the summer is the hottest or the coolest, the driest or the wettest, the winter is the mildest or the most severe in the memory of the oldest inhabitant!

TROPICAL UNIFORMITY VS. TEMPERATE CHANGEABILITY

The present collection of diagrams attempts to set forth the facts of the actual temperatures in all America, almost from the Arctic to the Antarctic (Fig. 1), by showing the afternoon heat and the nightly cooling day by day throughout the hottest month and the coolest month of a whole year. For a good many places the year is 1904.

On examining these diagrams we shall see that regularity, monotonous recurrence of a fairly constant change from warm days to less warm nights, is the characteristic of tropical temperatures, and that changeability, incessant alternation of stimulating spells of heat and cold, characterize our temperate zone. It is not true that our weather is more temperate than tropical weather. It is not true that the equator is the hot belt of the earth. It is not true that the temperature régime of all the zones may be found in the torrid zone on ascending from the lowlands to the lofty mountain heights. Our weather is intemperately changeable. The world's greatest heats are encountered along the borderland between temperate and torrid zones. Each level in the mountains of the torrid zone is characterized by monotonous repetition of one set of temperature oscillations—among lower and lower temperatures at higher and higher altitudes, it is true, but quite without the sudden changes or even the contrasts between summer and winter temperatures that mark the temperate and polar zones. The night is the winter of the tropics, recurring with very little difference 365 days in a year, whether it be from days between 75° and 90° to nights between 60° and 75° beside the Gulf of Mexico at Havana, or days between 20° and 30° and nights between 7° and 20° at the summit of El Misti, 19,000 feet above the waters of the Pacific, near Arequipa, Peru.

Attention was called in the pages of this publication¹ several years ago

¹ Mark Jefferson: The Steady Warmth of the Tropics, *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 346-348.

PANAMA

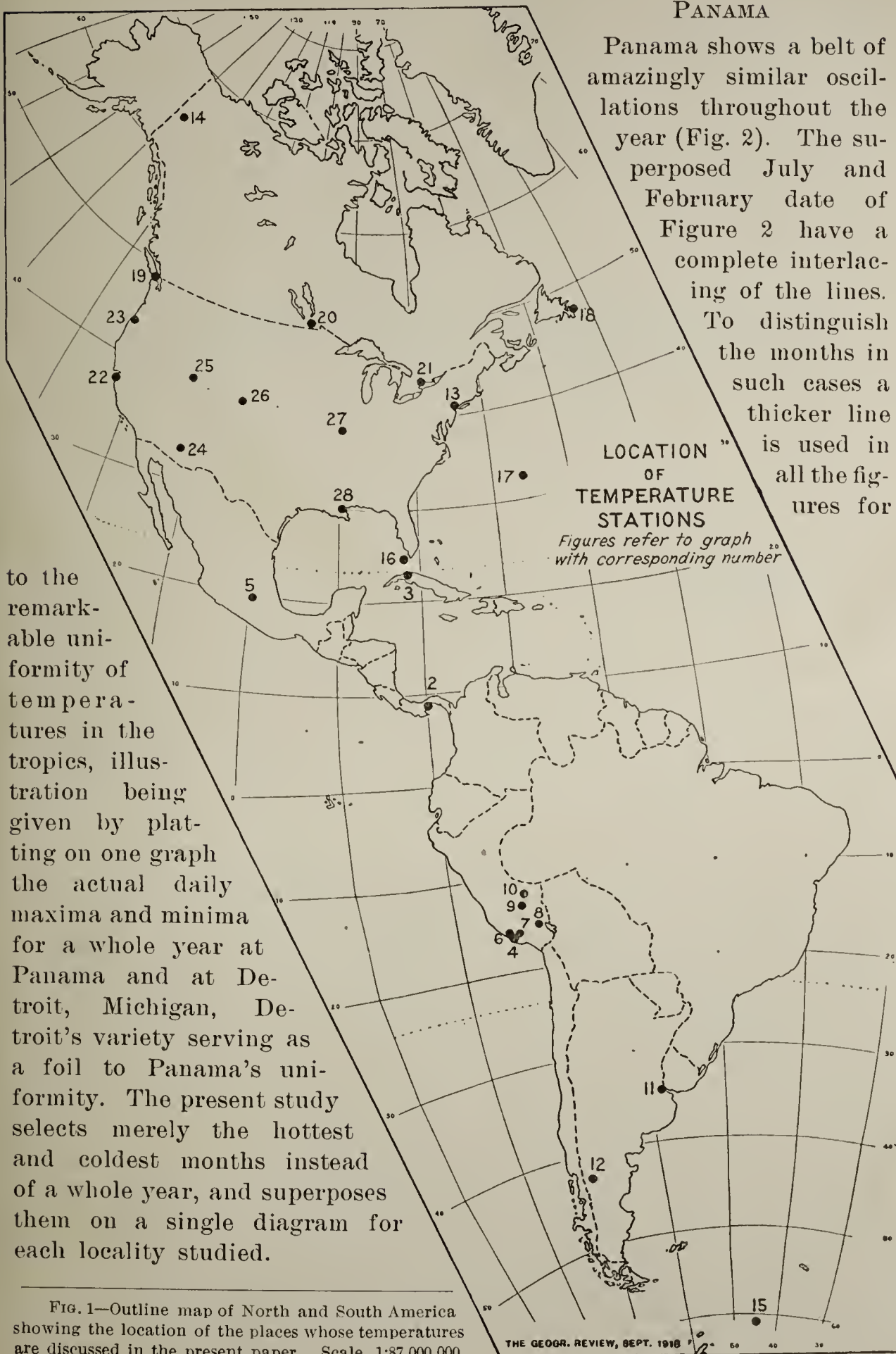
Panama shows a belt of amazingly similar oscillations throughout the year (Fig. 2). The superposed July and February date of Figure 2 have a complete interlacing of the lines. To distinguish the months in such cases a thicker line is used in all the figures for

LOCATION OF TEMPERATURE STATIONS

Figures refer to graph with corresponding number

to the remarkable uniformity of temperatures in the tropics, illustration being given by plating on one graph the actual daily maxima and minima for a whole year at Panama and at Detroit, Michigan, Detroit's variety serving as a foil to Panama's uniformity. The present study selects merely the hottest and coldest months instead of a whole year, and superposes them on a single diagram for each locality studied.

FIG. 1—Outline map of North and South America showing the location of the places whose temperatures are discussed in the present paper. Scale, 1:87,000,000.



the warmer month. The February mean temperature at Panama is 80.8° , that of July 81.1° . So far as temperatures by the thermometer are concerned one cannot tell the hottest month of the year from the coldest, though as July is a month of the rainy season the humidity doubtless makes the *sensible* temperature—with which we are not here concerned—much hotter. But one swallow does not make a summer, and Panama may not be perfectly typical of tropical lowlands. What are the facts for Havana, for instance?

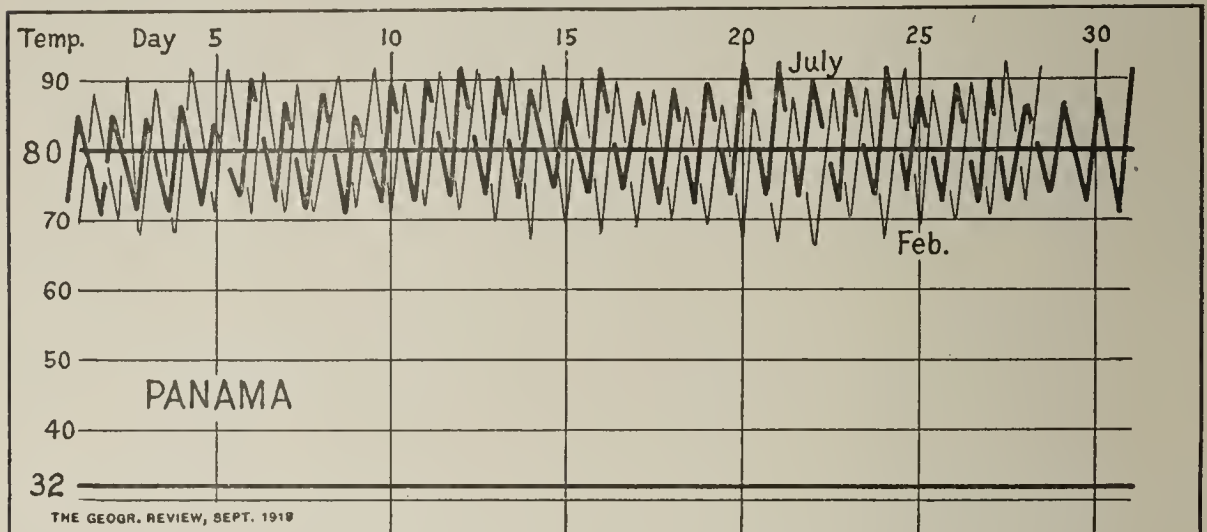


FIG. 2—Daily maximum and minimum temperatures at Panama in July and February, 1913.

July: mean 81.1° ; range 16° ; variability 1.2° ; rainfall 4.85 ins.

February: " 80.8° ; " 19° ; " 1.7° ; " 0.22 ins.

Throughout the graphs, Figs. 2-28, the heavier curve represents the warmer, the lighter the colder month. The upper points of the curves represent the day-time, the lower points the night-time temperatures. The mean temperature of each of the two months shown is indicated by a broken horizontal line (not shown on this graph). The 80° and 32° lines are emphasized as representing the lower and upper limits respectively of temperatures termed in this paper *hot* and *cold*.

HAVANA

August is the hottest month and January the coldest (Fig. 3). There is still a great deal of steadiness, especially in the hotter weather. Havana is about 23° north of the equator, over twice as far as is Panama. The summer sun is well-nigh overhead, while in January it is halfway down to the southern horizon. January is distinctly cooler than August, in the mean 13° cooler. In actuality August afternoons range from 87° to 92° , and January ones from 69° to 82° . The nights in August range from 69° to 76° , in January from 52° to 65° . August is easily distinguished from January by greater warmth and much greater steadiness of temperature, though the irregularities of winter are not strong enough to make much difference. The nearest approach to a "spell of weather" is the last seven days of the month, with nights at 66° and days about 81° .

Two dark lines drawn on all these diagrams at 80° and 32° serve to compare temperatures from place to place. Arbitrarily it is proposed to call temperatures above 80° *hot* and those below 32° *cold*. This will give us a precise phraseology that is very convenient and not wholly without reason.

If we care to discriminate further we may call it *cool* between 50° and 32° , *mild* between 68° and 50° , and *warm* between 80° and 68° .

Accordingly, in August, days in Havana are hot and nights warm; February nights are mild and days warm. In Panama, on the other hand, days are hot and nights warm at all seasons. It is especially interesting to note that days in the high 90's and 100's with nights in the 80's, as in

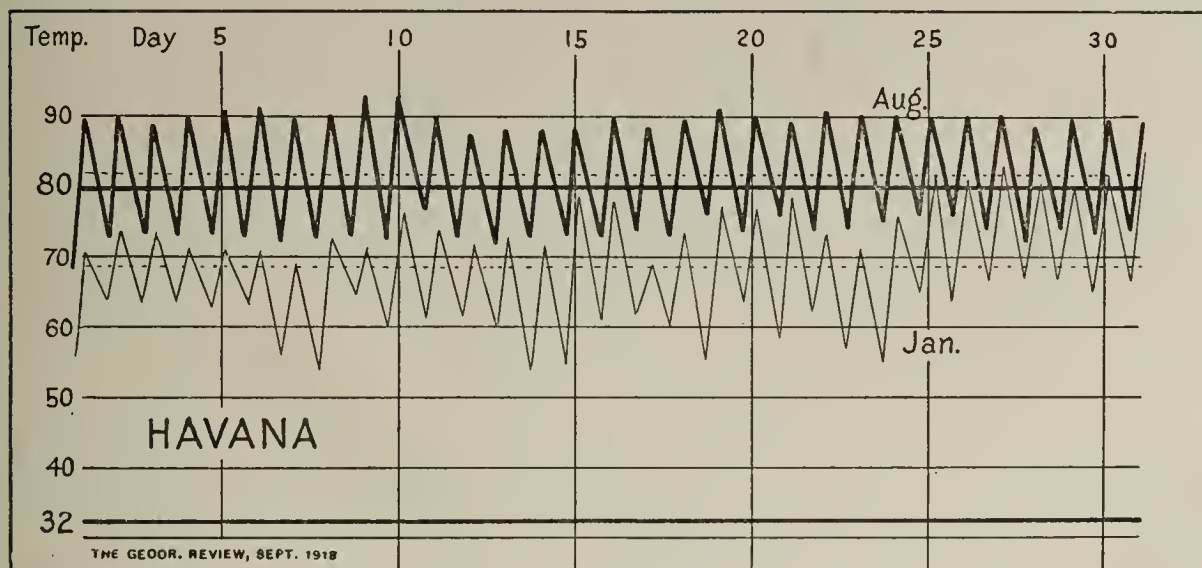


FIG. 3 (year: 1902).

August:	mean 81.8° ;	range 16.4° ;	variability 0.9°
January:	" 68.2° ;	" 14.2° ;	" 2.8°

Chicago, July, 1916, occur only in the temperate zone. In the tropics they are unknown.²

MOLLENDO

A third tropical locality, close to sea level, like the first two, is Mollendo, 17° south of the equator on the Peruvian coast (Fig. 4). Mollendo shows the same tropical type of weather. February is the hottest month, as we are now south of the equator, and July one of the coolest. But Mollendo differs from both of our previous tropical examples in having no hot days. Warm days and nights are characteristic of February, mild days and nights prevail in July. Both Panama and Havana stand beside seas whose surface waters have a temperature of 80° , Mollendo beside waters at about 70° .

VARIABILITY AS A CRITICAL FACTOR

The reader should not miss the note of actuality in these diagrams. He reads instantly here the highest afternoon temperature that occurred in the year indicated on any and every day of the hottest month and of the coolest month. On the 9th or the 17th, or whatever day you will, the

² The nearest approach to this condition is in dry continental interiors: e. g. Fort Archambault (Shari River, central Africa, lat. 9° N.) had in April a mean maximum of 100° and a mean minimum of 75.4° ; Daly Waters (northern Australia, lat. $16\frac{1}{2}^{\circ}$ S.) in January, 1912, a mean maximum of 102.7° and a mean minimum of 76° .

thermometer went so high or fell so low. The mind imagines the clothing suitable for street wear, what bedding would be agreeable at night. Average temperatures can never serve as a basis for such ideas. Yet a use may be made of averages to get a measure of the variability, which, it should be emphasized, is characteristically low in the tropics and high with us. For this purpose the average temperature of the whole day, roughly

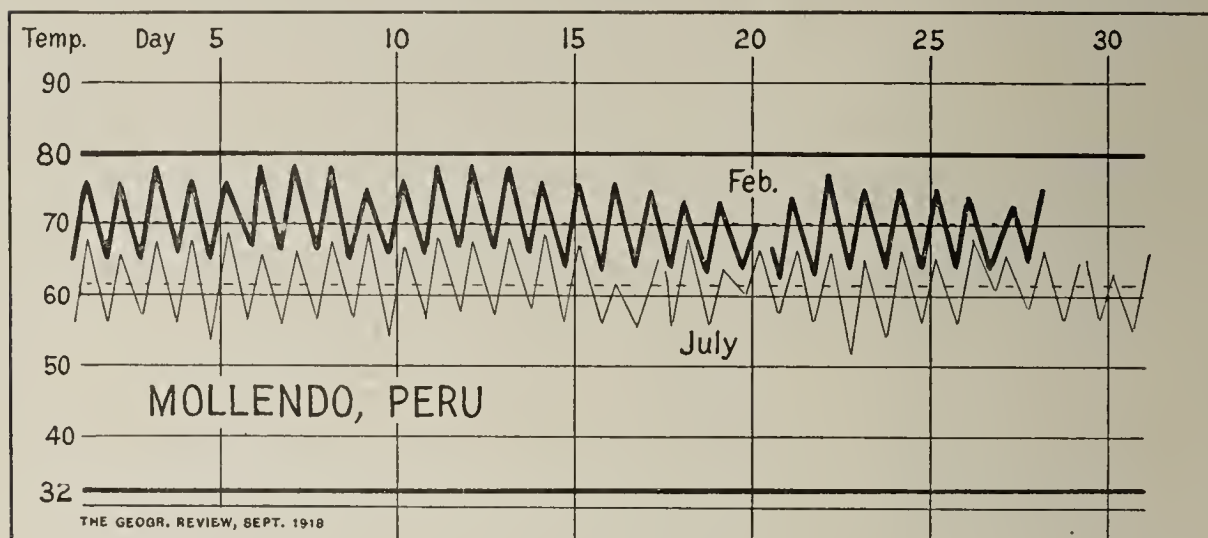


FIG. 4 (year: 1895)

February: mean 70.3°; range 11.0°; variability 1°
 July: " 61.6°; " 10.4°; " 1°

expressed by the half-sum of the day's maximum and minimum temperatures, is compared with the mean temperature of the whole month, as derived from the sum of all the maxima and minima divided by twice the number of days in the month. At Panama no day of either month shown has a mean temperature that differs more than 3° from the mean of the month. The average difference of all the July days from the mean is 1.2°; of the February days 1.7°. For Havana the mean variations of daily and monthly means are 0.9° for August and 2.8° for January. No single day of August at Havana varies more than 3° from the mean of the month. The more variable January, however, has nine days each of which is more than 5° warmer or cooler than the monthly mean. Mollendo has a mean variability of 1° in both February and July; neither month has a single day of mean temperature 5° different from the mean of the month.³

TOLUCA, MEXICO

In tropical America great human interest attaches to the highlands on account of the long-continued occupation of the lofty Mexican and Andean

³ This variation of the mean of the days from the mean of the month must not be confused with the daily range of temperature—the difference between the maximum and minimum for the day. The variability may be very small indeed while the daily range of temperature is very large. For that it is only necessary that the same large daily oscillation of temperature be repeated with great steadiness day after day. The cooler month at Arequipa on Fig. 7 is a good example of great daily range and small variability. It should also be remarked that this expression of variation is not the same as that ordinarily described by the meteorological term "mean diurnal variability," which is the average of the temperature differences between successive days.

plateaus by native races who had attained the highest culture of all American peoples. Figure 5 gives the graph for Toluca, capital of the State of Mexico, 40 miles west-southwest of Mexico City, for December, 1902, and April, 1903. Ordinarily May is one degree warmer than April, but it was not so in 1903. Toluca, in latitude 19.3° N., is well within the tropics and 8,810 feet above the sea. Its temperature shows the same tropical steady-

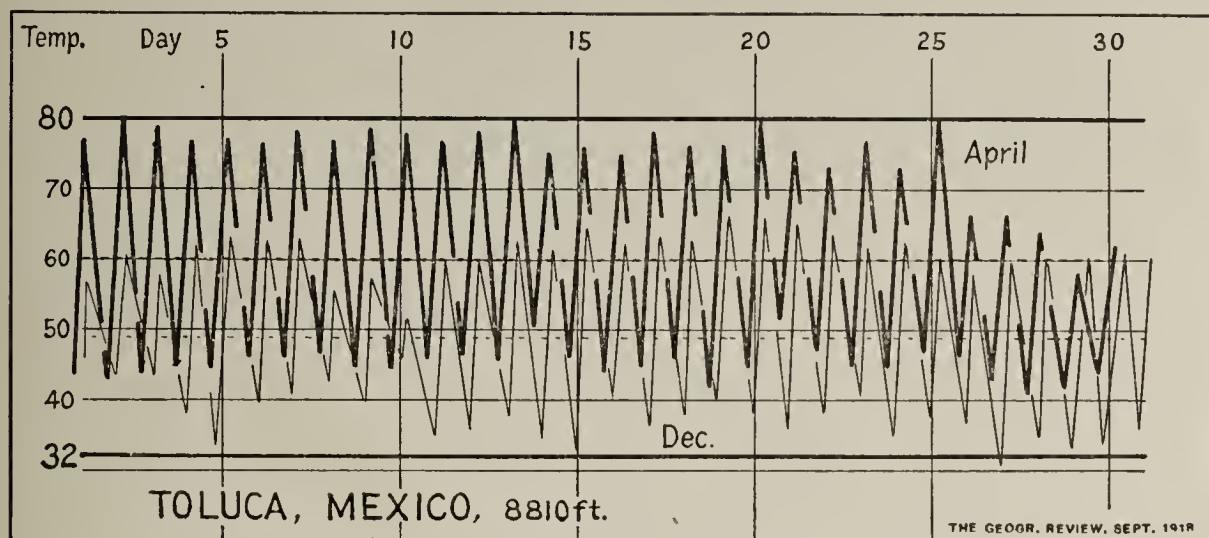


FIG. 5 (year: April, 1903, and December, 1902)

April: mean 60.0° ; range 30° ; variability 2.5° ; rainfall 0.70 ins.

December: " 49.5° ; " 23° ; " 1.8° ; " 0.53 ins.

ness as the three previous graphs. Expressed quantitatively, the mean variability of temperature for April is 2.5° , for December 1.8° . April had one day differing 10° from the mean and four differing from it by more than 5° . December has a single day differing more than 5° from the mean. Further, Toluca had no *hot* day and no *cold* day. Warm days with nights mild to cool characterize April, and mild days with cool nights December.

MAINTENANCE IN THE TROPICS OF UNIFORMITY OF RÉGIME WITH INCREASING ALTITUDE

These are the most temperate temperatures in the world. It is to be noticed that the only change that has accompanied the elevation nearly two miles into the air is a change of the *pitch*, so to say, at which the temperature scheme is developed. We have got no winter by going up from sea level, but merely the same steady tropical oscillation among cooler temperatures. There is still the same monotonous daily swinging of the thermometer between limiting values that are almost fixed. We shall see below that real winter consists not merely of cold weather, but of cold weather strongly differing from a season of summer and highly variable in itself. A wire bent into the shape of the Panama graphs and laid along the 80° line of our temperature frame represents the temperatures of tropical lowlands. To represent the facts for various heights in the tropics, we have only to place the wire at lower levels on the diagram.

The increase in the daily range of temperature is local and not dependent on the height alone. More will be said of that later. But no position of such a wire can correspond to real winter.

PERUVIAN HIGHLAND STATIONS

We are fortunate to have means of illustration in the admirable work of the Peruvian Expedition of Harvard University.⁴ A series of seven stations that will serve our purpose is found there. The observations were made for a very brief time, rarely much more than a year or two, by volunteer observers, but they are of the greatest interest because of their location.

	<i>Elevation</i>	<i>Latitude</i>	<i>Longitude</i>
Mollendo	Sea level	17.1° S.,	72° W.
La Joya	4,140 feet	16.8° S.,	72.2° W.
Arequipa	7,550 feet	16.4° S.,	73.1° W.
Vincocaya	14,360 feet	15.7° S.,	71.2° W.
Cuzco	11,100 feet	13.5° S.,	72° W.
Santa Ana	3,400 feet	12.5° S.,	73.2° W.

La Joya and Arequipa are on the western slopes of the Andes, Vincocaya on the summit of the Andean plateau, the ancient city of Cuzco in a sheltered valley sunk in the plateau, and Santa Ana “well beyond the eastern Cordillera near the limits of civilization; the valley is broad and bounded on the east and west especially by hills of moderate elevation.”⁵

LA JOYA

In Mexico the hot month was 11° warmer in the mean than the cold one. At La Joya (Fig. 6) the warm month is but 8.5° warmer than the cold

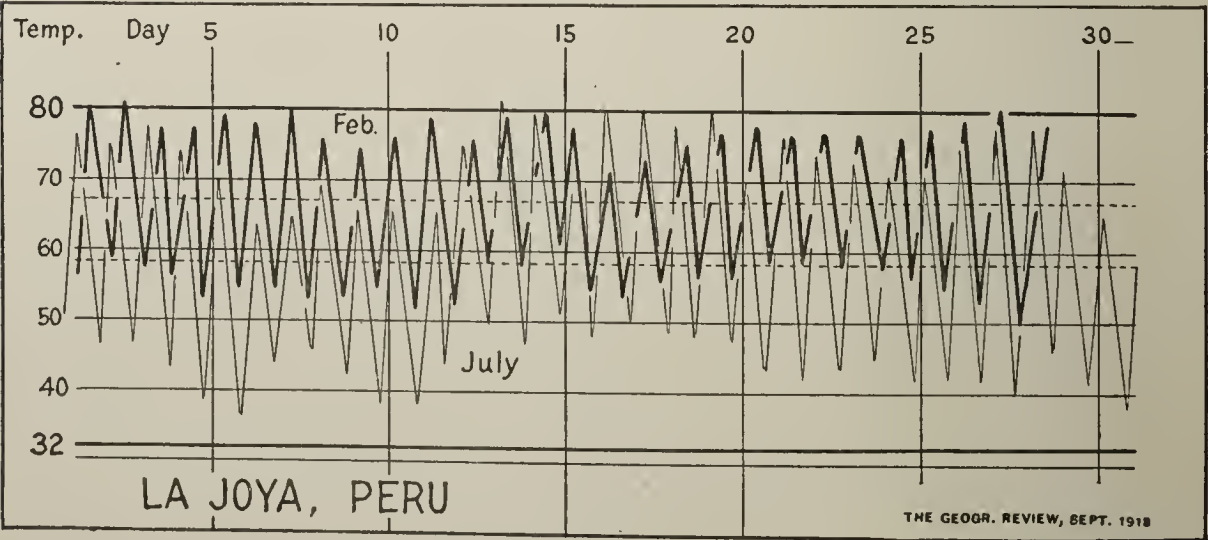


FIG. 6 (year: 1894)
February: mean 67°; range 22°; variability 1.4°; cloudy days 22
July: " 58°; " 28°; " 3.3°; " " 9

⁴ S. I. Bailey: *Peruvian Meteorology, Annals Astron. Observ. of Harvard College*, Vols. 39 and 49, Cambridge, Mass., 1899 and 1906; 1907 and 1908.
⁵ *Ibid.*, Vol. 39, Part 11, p. 162.

one. The striking feature of temperature here is that the daytime heats are so little different in the hottest and the coldest months, while the July nights are fully 10° colder than those of February. The range of temperature in the colder month was much greater, 28° in mild July and 22° in warm February. This difference was due to clouds. There were 21 or 22 cloudy days in February and but 7 or 8 in July. Both months had warm afternoons; but in February the nights were all mild, in July all cool. The mean variation of February days from the average temperature of the month was 1.4° , of July days 3.3° . No February day had a mean differing so much as 5° from the monthly mean. July had one day that differed by 10° and ten that differed by more than 5° . Like Toluca, La Joya had no hot temperatures nor cold ones, though it is little more than half as high above sea level.

AREQUIPA

Arequipa (Fig. 7) is nearly as high above the sea as the Mexican city, and its temperatures are very similar. In Arequipa it gets neither hot nor

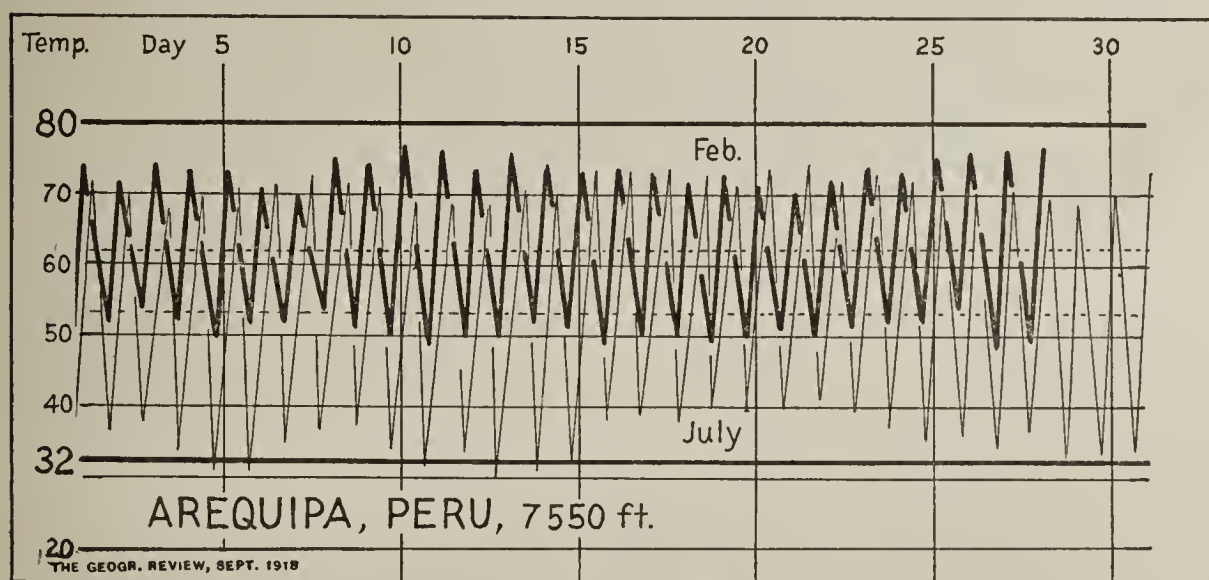


FIG. 7 (year: 1889)

February: 62.2° ; range 23° ; variability 0.8° ; rainfall 0.08 in.

July: 53.5° ; " 36° ; " 1.8° ; " 0.00

cold. Its temperature régime is strictly tropical, no day varying by 5° from the monthly mean; and the average variabilities of the warm and cold months are 0.8° and 1.8° respectively. Toluca had 2.5° and 1.8° . The mean temperatures of Arequipa's two months are 62° and 53.5° . Toluca had 60° and 49.5° . Arequipa's hottest temperature was 77° and its coldest 30° . Toluca had 80° and 31° . The daily range of temperature at Arequipa is 23° and 36° . Toluca had 30° and 23° . Still more exactly than at La Joya the afternoons at Arequipa reach about the same temperatures in the hottest and coldest months, but the nights of the cold month run much colder than the nights of the warm month. Warm days and mild nights characterize

the warmer weather, and warm days and cool nights the coolest. There is nothing of winter in all this. The rainfall of February was 0.08 inch. In July there was none at all. The cloudiness of both months was reported a little over 5 on a scale of 10 for the year 1889, but for the four years 1892-95 the cloudiness averaged about 5 in February and in July 2.7, the daytime clouds cutting down the February maxima.

VINCOCAYA

Vincocaya is on the great shivering Andean tableland, at 14,360 feet above the level of the sea. The régime is still tropical (Fig. 8). November is now the warm month, averaging 4° warmer than any other. June was

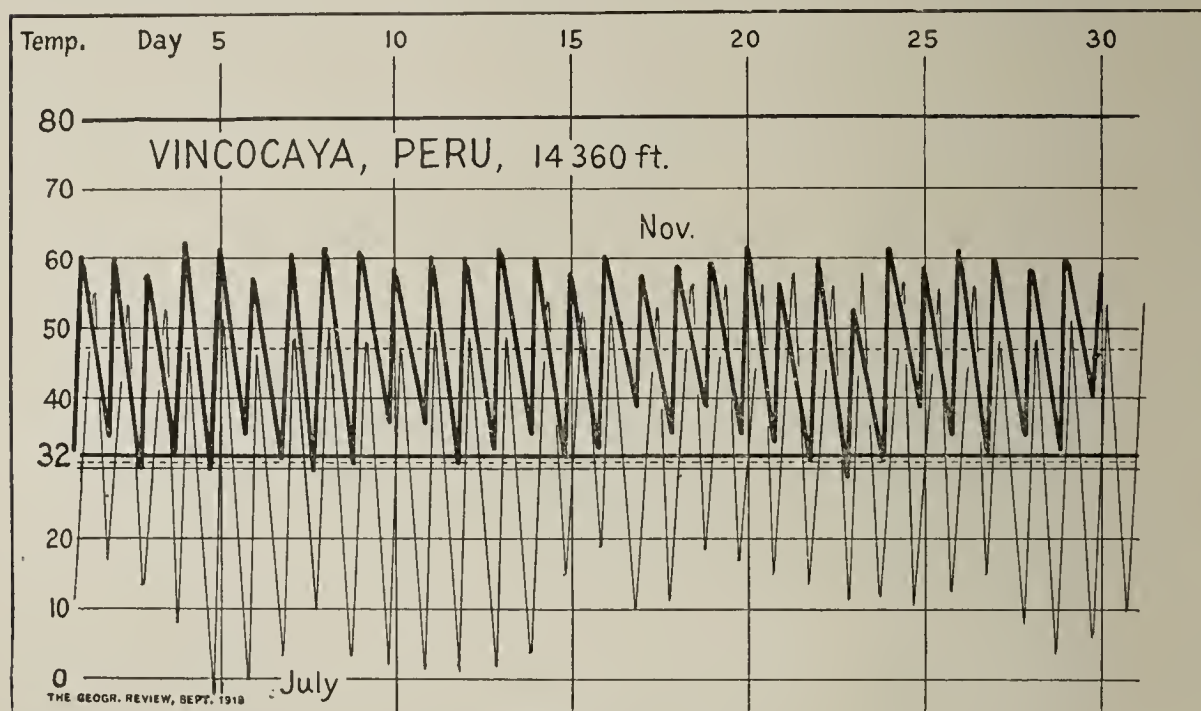


FIG. 8 (year: 1889)

November: mean 47° ; range 26° ; variability 1.3° ; rainfall 0.54 in.
 July: " 31° ; " 43° ; " 3.7° ; " 0.00

reported 0.2° cooler for the year 1889, but July may serve us, as we have its data. All the characters first described for Arequipa are seen again here. November days are mild, and the nights cool. July days are mild, and the nights cold. But this is not winter. The temperature is rarely above 60° . In the shade one is cold at all hours and at all seasons, but it is a continuous cold, unchanging from month to month. The range of temperature in the cooler month is now tremendous. One day starts in early with temperature below zero and by afternoon it has reached 52° , to fall below zero again by next morning. Truly the night is the winter of the tropics. Where these lines are being written, in Michigan, the temperature is falling below zero every night, but it has not been up to 50° in months, an excursion that the thermometer at Vincocaya makes in a few

hours. Its range is 26° in November, in July 43°.⁶ There was .54 inch of rain in November, none in July. The average variation of the daily mean from the mean of the month was 1.3° in November, in July 3.7°—the greatest variability we have yet observed, as the diagram suggests. November had one day differing by 5° from the mean, and July had ten.

Cuzco

Now we descend from the wind-swept *páramos* of Vincocaya to the ancient Inca city of Cuzco, sunk in its sheltered valley 3,000 feet below.

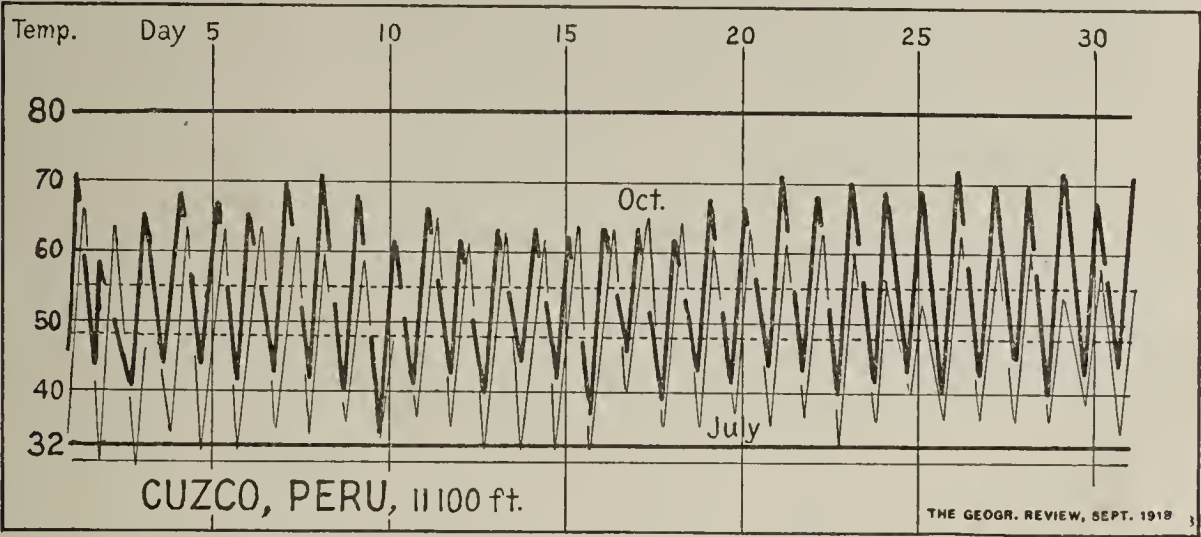


FIG. 9 (year: 1895)

October: mean 55°; range 25°; variability 1.9°; rainfall 4.58 ins.
July: " 48°; " 27°; " 1.0°; " 0.29 ins.

Although half a mile higher in the air than Toluca we are close to Mexican temperatures (Fig. 9).

	Toluca		Cuzco	
Mean temperature	April	60°	October	54.5°
	December	49.5°	July	48°
Daily range	April	30°	October	25°
	December	23°	July	27°
Variability	April	2.5°	October	1.9°
	December	1.8°	July	1°

Mild days and cool nights all the year, as in Toluca's cooler month, merely mark Cuzco as cooler than Toluca. Cuzco has 4.6 inches of rain in October with but 0.3 inch in July. The temperatures are still tropically steady. October has a single day varying over 5° from the mean of the month. July has no day that varies more than 3°.

SANTA ANA

Now we pass the Andes and examine the temperatures at the ranch Santa Ana among the eastern foothills at the edge of the great Amazonian

⁶ For similar examples in other stations of the Peruvian Andes see the graphs of diurnal range of Morococha (14,300 feet) and Santa Lucia (15,500 feet) in Isaiah Bowman: *The Andes of Southern Peru*, New York, 1916, pp. 172 and 162.

lowland (Fig. 10). Our crooked wire is lifted to the 80° line, for we are now little more than half a mile above sea level. Both November and July have hot days and cool nights. November averages 75.5°, and July 70° with daily ranges of 24° and 29°. The average variation for both

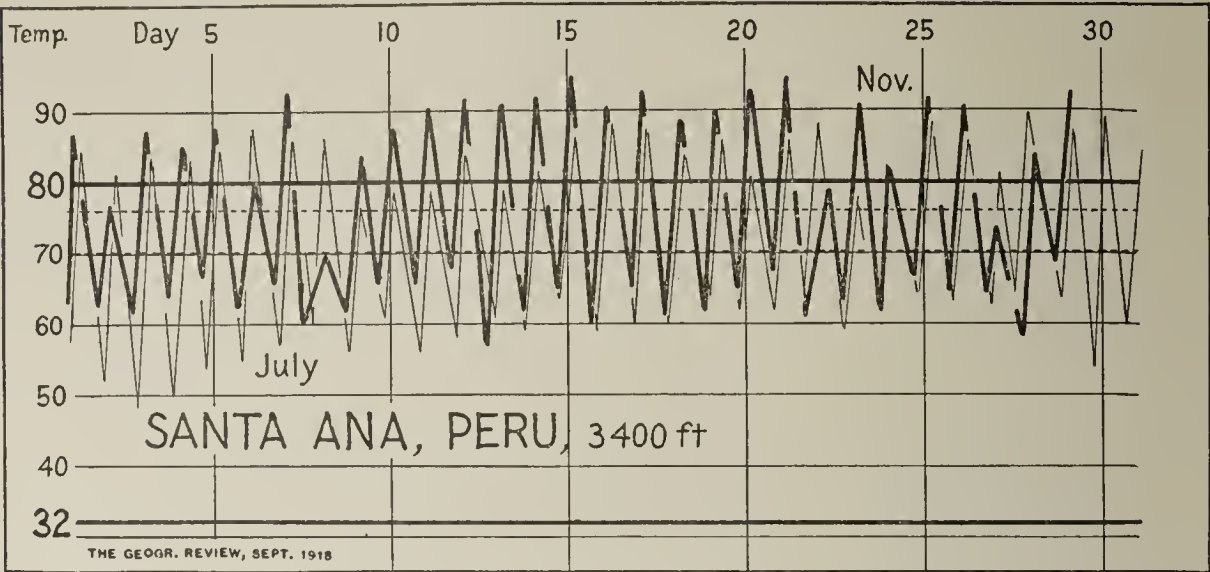


FIG. 10 (year: 1894)

November: mean 76°; range 24°; variability 3.3°; rainfall 1.45 ins.
July: " 70°; " 29°; " 3.3°; " 0.00

months is 3.3°, if the record is trustworthy. November has one day varying over 10° from the mean, and six days over 5°. July has eight days differing more than 5°.

VARIABILITY AS THE DISTINGUISHING FACTOR BETWEEN TROPICAL AND
TEMPERATE RÉGIMES

To say the night is the winter of the tropics is to say they have no winter. We have seen the extraordinarily temperate character of the tropical warmth. As far as heat changes are concerned the tropics are the truly temperate regions of the earth. In the tropics the variability of the daily temperature means from the means for their month is very low. The facts are gathered together in the following table.

	LATITUDE	ELEVATION IN 1,000 FT.	VARIABILITY	
			<i>Hot month</i>	<i>Cold month</i>
Panama	9° N.	0	1.2°	1.7°
Havana	23° N.	0	0.9°	2.8°
Mollendo	17° S.	0	1.0°	1.0°
Toluca	19° N.	8	2.5°	1.8°
La Joya	17° S.	4	1.4°	3.3°
Arequipa	16° S.	8	0.8°	1.8°
Vincocaya	16° S.	14	1.7°	3.7°
Cuzco	14° S.	11	1.9°	1.0°
Santa Ana	12° S.	3	1.3°	1.3°

Roughly speaking, tropical days may vary about $1\frac{1}{2}^{\circ}$ from the mean of the month in the warm season and in the cool season. The only weather at all like this beyond the tropics is on oceanic islands, where we shall find such equivalent values as 1.3° in the warm weather and 5.6° in the cold, a similarity for the warm season only, cool weather having a variability twice as great. But typical continental places in the temperate zones have variabilities in the warm and cool weather respectively of 3.7° and 6.9° . This is indeed their most striking characteristic as lands with winter, and the winters are particularly characterized by variability. As a certain element of vagueness always attaches to considerations of averages, it may make the matter somewhat clearer to say that out of the nine warm and nine cool months of tropical temperature considered here (a total of 552 days) just 3 days had a mean temperature that differed more than 10° from the mean temperature of their month, and only 47 days differed from the monthly mean by more than 5° . These 47 amount to less than 9 per cent of the total time. But of the 920 days of temperature here studied for the temperate zone 320, or 40 per cent, varied in their mean more than 5° from the mean of the month; 146 days, or 16 per cent, varied more than 10° ; and 21 days, or over 2 per cent, more than 20° !

Dwellers in the tropics cannot find winter merely by climbing to mountain snows. They must pass out of the torrid zone into the extratropical regions. The temperature graphs that are encountered can no longer be represented even approximately by one bent wire placed at various temperatures on our diagram, but we need a new wire of very irregular shape, especially to represent the season of winter.

DIFFERENCES BETWEEN WARMEST AND COLDEST MONTHS, AND ABSOLUTE TEMPERATURE RANGE

It is of course also true that the difference is very slight between the warm and cold months in the tropics, as is shown in the little table here printed, the first column of whose figures gives the differences between the mean temperatures of the warm and cool months shown on the torrid

	<i>Differences Between Means of Warmest and Coolest Months</i>	<i>Absolute Range of Temperatures</i>
Panama	0.3°	27°
Havana	14°	40°
Mollendo	9°	29°
Toluca	10°	49°
La Joya	8.5°	52°
Arequipa	9°	47°
Vincocaya	16°	75°
Cuzco	7°	45°
Santa Ana	5°	49°
Average	9°	46°

zone diagrams. The mean of the nine values is about 9° . Now the mean difference of temperature of the seasons of the three islands or oceanic stations in the temperate zone discussed in this paper is 22° ; for the sixteen continental points in the temperate zone, 38° . Yet more striking are the contrasts between the actual highest and lowest temperatures reached in the torrid and temperate zones. This is given in the second column of figures. The corresponding absolute ranges at temperate zone places attain 120° , 126° , and 129° . The least differences found among the places studied in the temperate zone are 58° and 61° , and the average value is 93° ! In other words the difference between mean warm and cold month temperatures is four times as great in the temperate zone as in the tropics, and the absolute range of temperatures twice as great. But for man it is pretty certain that the chief advantage of the temperate zone over the torrid lies in the stimulation resulting from its great daily variability.

BUENOS AIRES

Buenos Aires, a sea-level station not very far beyond the southern tropic, is a good example to begin with (Fig. 11). It shows new things in

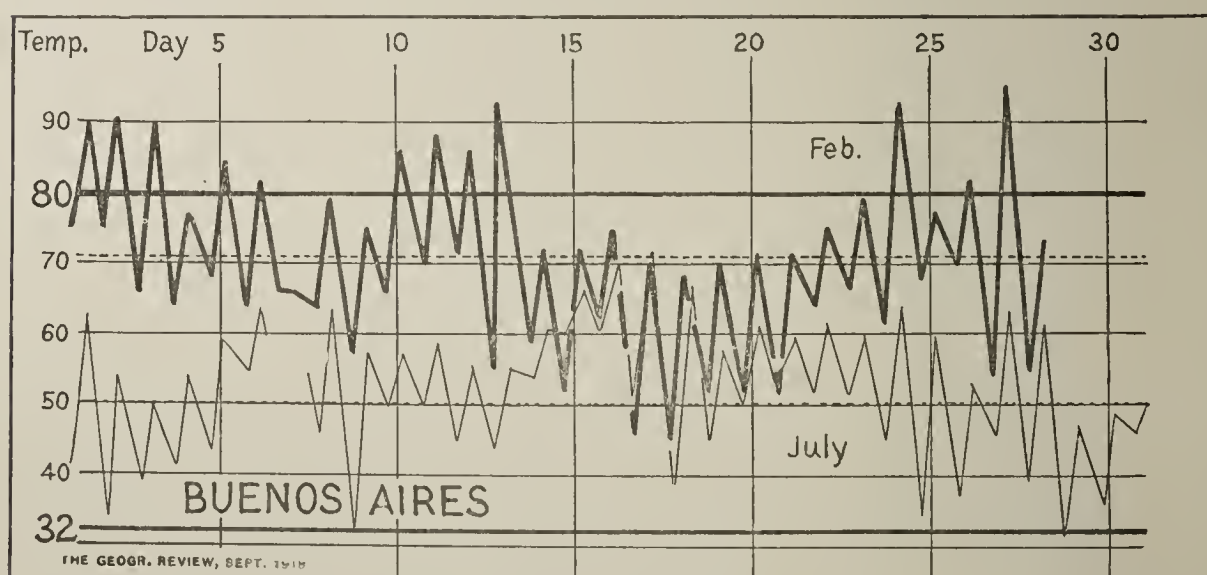


FIG. 11 (year: 1904)

February: mean 71° ; range 18° ; variability 6.1° ; rainfall 2.16 ins.
 July: " 50° ; " 10° ; " 5.0° ; " 2.48 ins.

the way of variability of the daily mean. For the summer, February is the type month; for this month the variability is 6.1° , for July, the winter month, it is 5° , that is, twice as much as in the tropics. The eye is satisfied that the graph is of unusual crookedness in comparison with its predecessors. Here are our first "spells of weather," several days that run well below the mean temperature followed by several more running well above it. At Buenos Aires this appears to be most striking in summer, unlike most stations in the United States, where such periods are much stronger

in winter. On one summer day a heat of 95° was reached, as great as any day we had record of at Santa Ana and greater than Havana or Panama during the year of our record. The winter temperature, however, twice touched freezing. February and July each had four days whose mean temperature differed more than 10° from the mean of the month and sixteen that differed more than 5° . But although characteristic in this element of changeableness, the winter of Buenos Aires is not cold. On the 17th the winter day happened to be warmer than the summer one. A winter warm spell may easily be as warm as a summer cool one; but there is no uniformity, no recurring of identical temperature oscillations. The summer is often warm, as often hot. The winter is mild or cool.

COLONIA 16 DE OCTUBRE

A most interesting record is that of Colonia 16 de Octubre in the southwest Argentine (Fig. 12). It lies in a foothill valley of the Patagonian

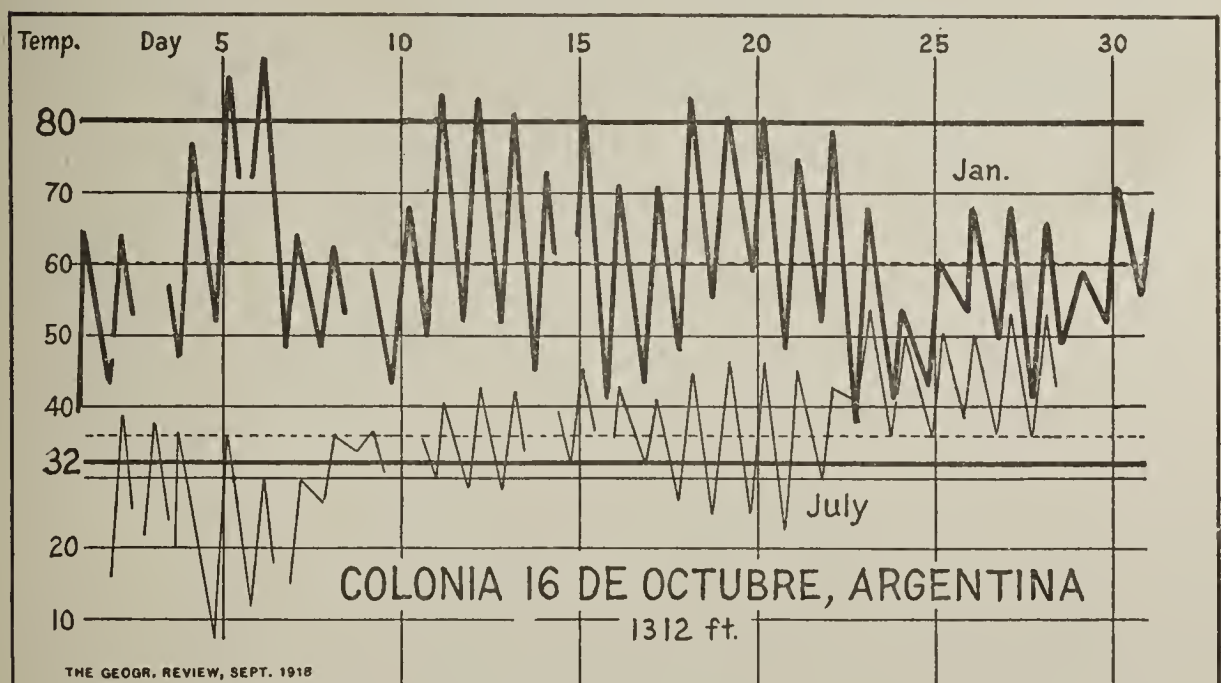


FIG. 12 (year: 1905)

January: mean 60° ; range 25° ; variability 5.3° ; rainfall 0.52 in.
 July: " 36° ; " 15° ; " 4.8° ; " 2.70 ins.

Andes, in 43° S., 600 miles farther south than Buenos Aires. It is of course colder than Buenos Aires, 12° colder in the mean of the year. The coldest month is 24° colder than the hot month, against a similar difference of 20° for Buenos Aires. The summer days are warm, occasionally hot, and the nights usually cool. In winter the days are cool, the nights cold. The daily range of temperature is strikingly great, 25° and 15° , while Buenos Aires has but 18° in both months. The smaller range of July is doubtless

due to clouds, as 2.7 inches of rain falls in that month against 0.52 in January. In the means the variability is a little less than at Buenos Aires, in January 5.3° and July 4.8° . Individual days, if allowance is made for missing observations, differ from the mean almost exactly as at Buenos Aires. This is rather surprising inasmuch as Buenos Aires is so much nearer the southern tropic than Colonia 16 de Octubre. Probably the narrowness of the southern continent in these latitudes prevents the development of distinct spells of weather.

NEW YORK

From the southern temperate zone we may well turn to the northern. New York is a lowland station like Buenos Aires, but it is six degrees

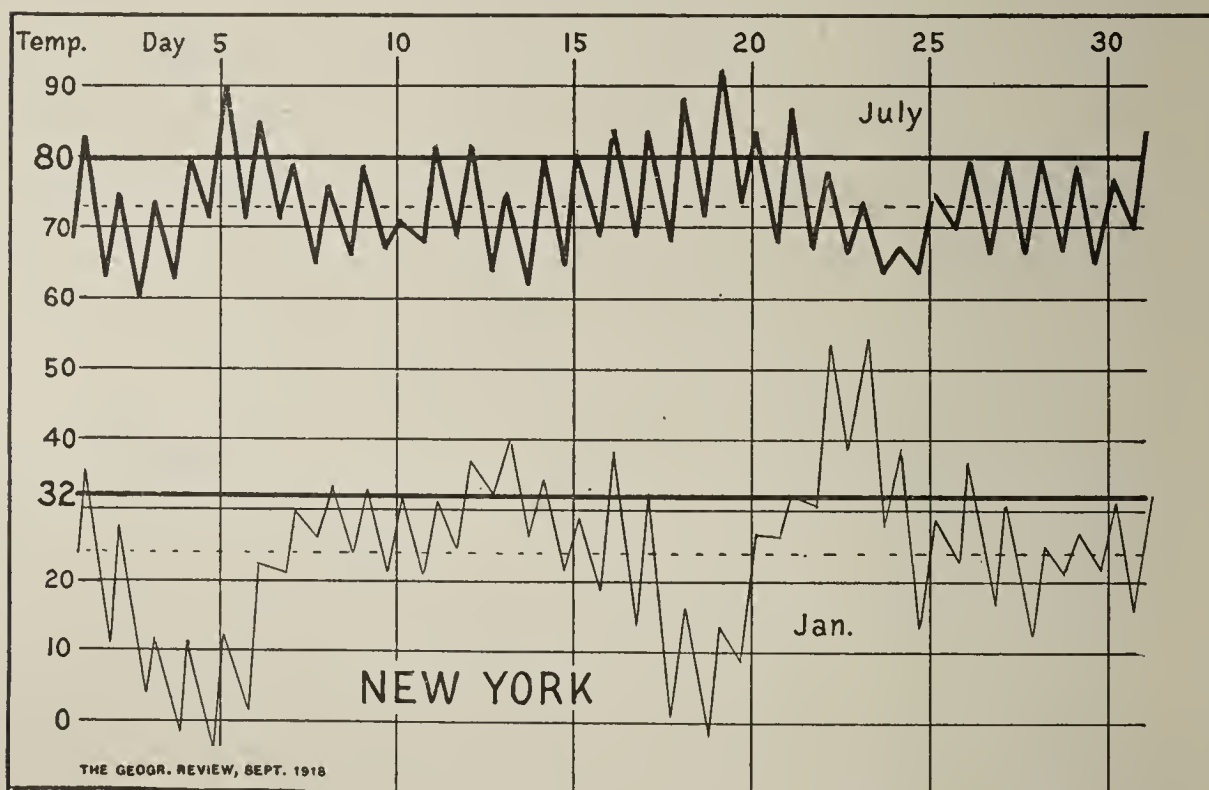


FIG. 13 (year: 1904)

July: mean 73.5° ; range 13° ; variability 3.0° ; rainfall 4.4 ins.
 January: " 24.0° ; " 12° ; " 9.3° ; " 3.4 ins.

farther from the equator and North America is three times as wide in this latitude as South America in the latitude of Buenos Aires. The chief novelty shown on the diagram (Fig. 13) is the further separating of summer and winter. At New York summer is frankly warm and winter cold. But the summer is much less variable than the winter. The highest temperature at New York was 93° , the coldest 4° below zero. At Buenos Aires the corresponding figures were 95° and 32° . At New York the mean of the warmest month was almost 50° warmer than the mean of the coldest month, against 21° at Buenos Aires. The chief meaning of this is that

the New York winter is really cold. But at New York the variability is 9.3° , exceeding Buenos Aires in this element almost as much as Buenos Aires outdid the tropical stations. That any day in the month may be 9.3 degrees warmer or colder than the mean of the month signifies very perceptible temperature fluctuations. To go a little into detail, New York in the winter of 1904 had three days of variability greater than 20° and eleven of more than 10° . A glance at the graph shows two very pronounced cold spells of from three to four days duration each, and two principal warm spells of from nine to twelve days.

DAWSON CITY

The most northerly station for which data are at hand is Dawson City in the Yukon, near the Arctic Circle (Fig. 14). The situation is conti-

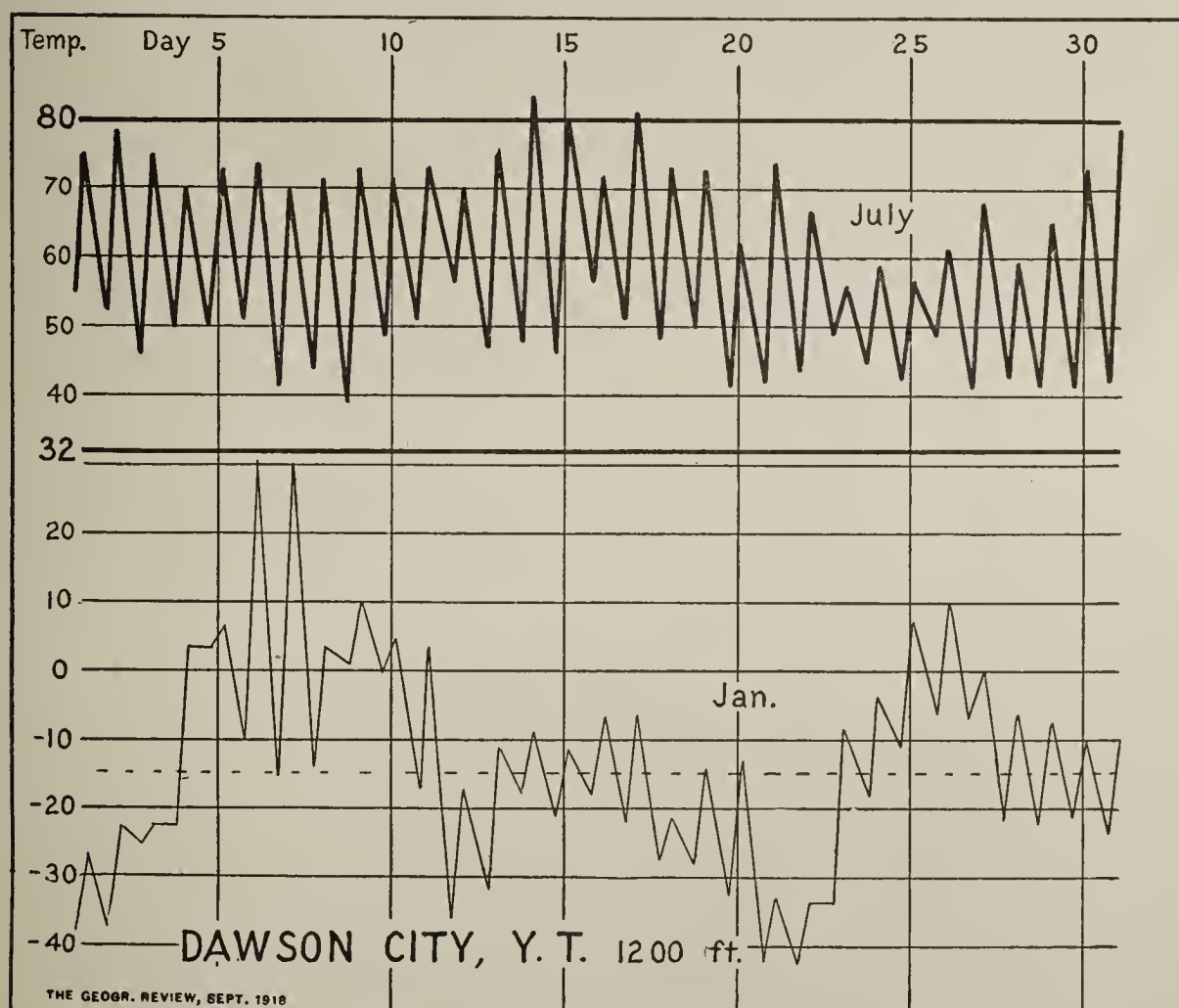


FIG. 14 (year: 1908)

July:	mean	60.0° ;	range	24° ;	variability	4
January:	"	-14.5° ;	"	15° ;	"	10

mental, walled off from the Pacific by the lofty Alaskan ranges. Summer days are warm, and nights are mild or cool; but the winter is bitterly cold, night and day. There were only two days in January, 1908, when the thermometer rose as high as 30° in the afternoon to fall back to 15° below at

night. The thermometer stayed below zero all the month except for parts of ten days. The average variability of Dawson days is a little greater than at New York, 4° in July and 10° in January. July had one day the mean of which differed from the mean of the month by 10° . January had five that differed more than 20° from the mean, and thirteen differing more than 10° . The graph illustrates the control of winter temperature changes by spells of weather, even more plainly than at New York. The summer at Dawson City is not strikingly variable. Dawson has the extreme continental type of temperature régime, with 75° difference between the means of the hottest and coldest months, and an absolute range of 126° .

LAURIE ISLAND, SOUTH ORKNEYS

Almost as different from land temperatures in the temperate zone as these are from tropical temperatures, are the temperatures of islands in

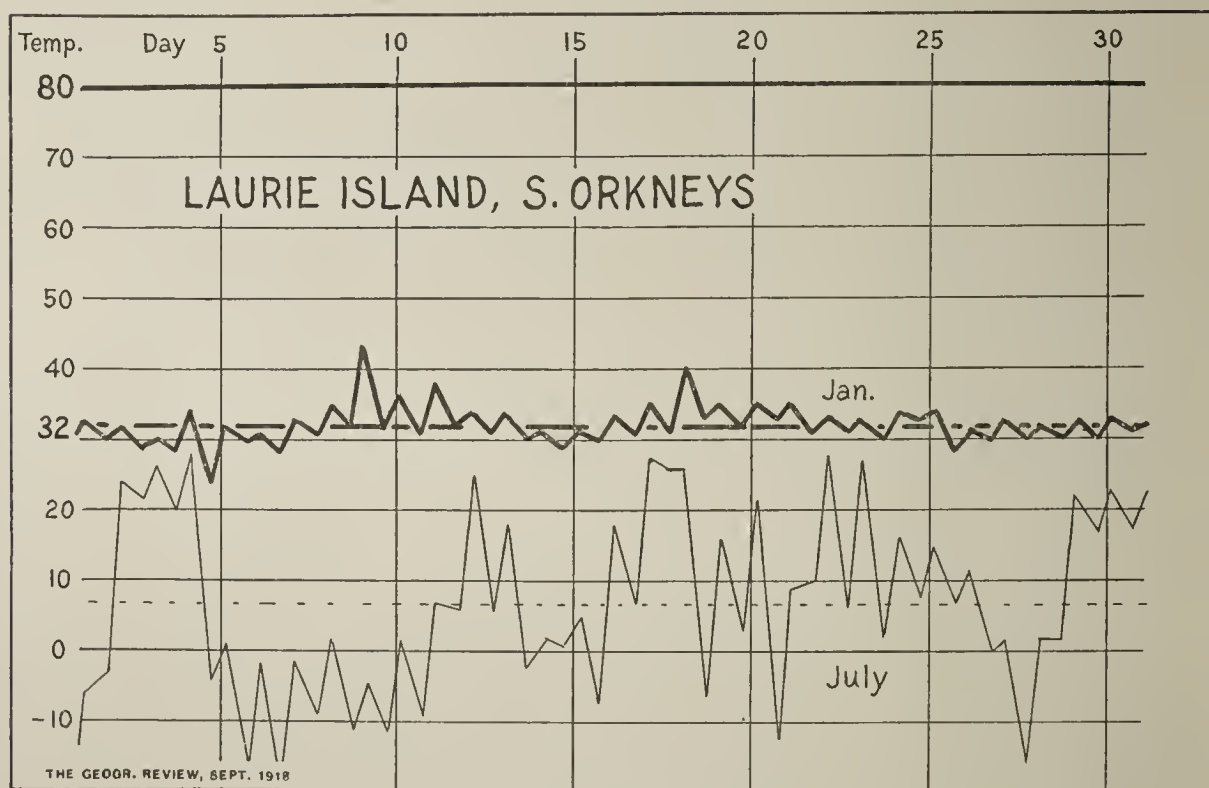


FIG. 15 (year: 1904)

January: mean 32° ; range 3.5° ; variability 1.5°
 July: " 7° ; " 13.0° ; " 9.5°

the temperate zone. For instance at Laurie Island, 300 miles south of Cape Horn in the South Atlantic Ocean, January, the summer month, is of the oceanic type (Fig. 15). The seagirt land holds as steadily at about 32° as if the sea were a great freezing mixture, thickly studded with floating lumps of ice. But the winter is of very severe character, with notable spells of weather. Always below the freezing point for salt water, it goes lower than -15° four times in the month, as if a frozen sea supplied a continental régime for the winter record. The mean variability of January

days, 1.5° , is to be contrasted with 9.5° for July. Laurie Island is in latitude 61° S., and its winter is the nearest like that of Dawson City that we have yet discussed from the southern hemisphere.

KEY WEST

Another oceanic record is for the island of Key West (Fig. 16), off the tip of Florida in the Gulf of Mexico. Its tropical situation in 25° N.

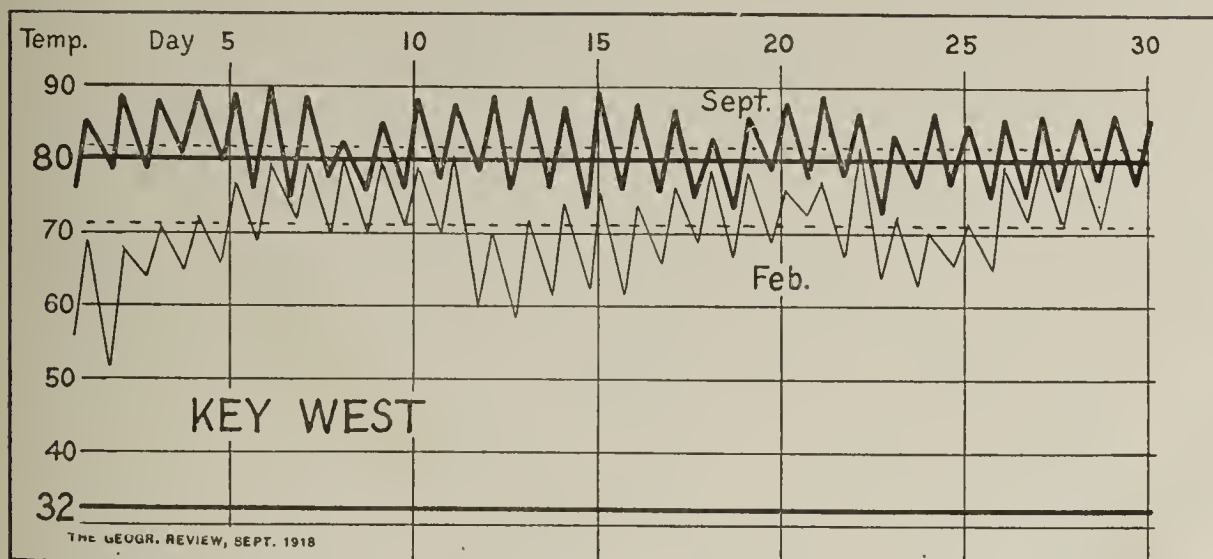


FIG. 16 (year: 1904)

September: mean 82° ; range 10° ; variability 1.2° ; rainfall 3.6 ins.

February: " 71° ; " 10° ; " 3.7° ; " 1.1 ins.

lifts the September temperatures to hot days and nights that are usually warm. September is the warmest month. Its variability is 1.2° . The

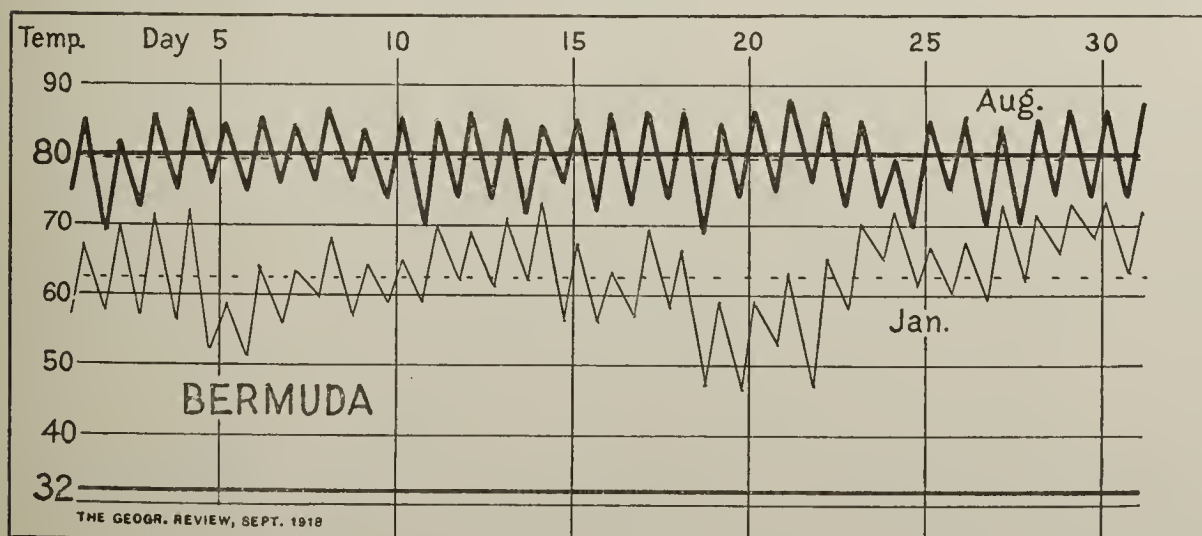


FIG. 17 (year: 1904)

August: mean 79.2° ; range 10.0° ; variability 1.2°

January: " 62.5° ; " 11.5° ; " 3.6°

winter, with warm days and mild nights, has fairly distinct spells of weather and a variability of 3.7° . Five days in February differed more

than 5° from the mean of the month. One might be tempted to attribute the winter spells of weather to the adjacent continent of North America were it not that the Bermudas, 800 miles out in the Atlantic, show almost identical forms.

PROSPECT, BERMUDA

The summer of these oceanic islands inclines to the tropical. The Bermudas' hot month (Fig. 17) is almost identical with Havana's except for the greatly lessened daily range of temperature, 10° to Havana's 16° : The winter, too, has a smaller daily range and distinct spells of weather.

ST. JOHNS, NEWFOUNDLAND

St. Johns, Newfoundland, is thrust far out into the North Atlantic in latitude 48° N. July and February represent the hottest and coldest months of the year 1908 (Fig. 18). The thermometer went up once to

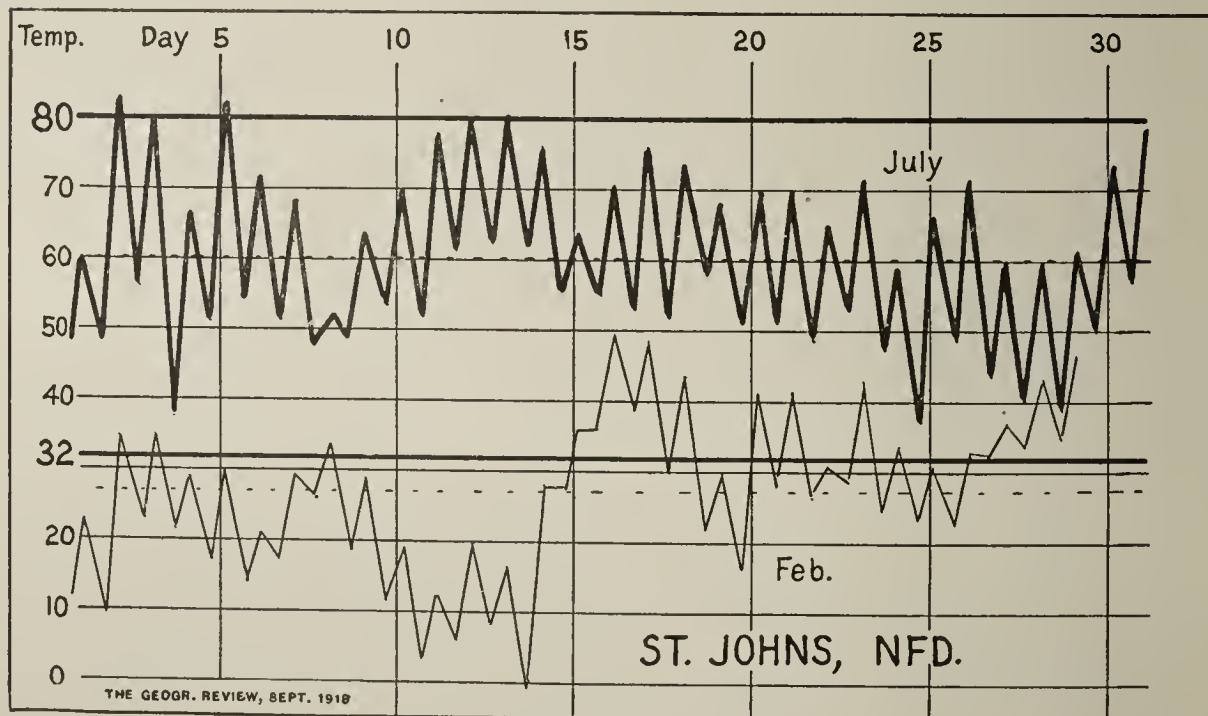


FIG. 18 (year: 1908)

July:	mean 60.5° ;	range 19° ;	variability 4.8° ;	rainfall 2.70 ins.
February:	" 27.0° ;	" 12° ;	" 7.8° ;	" 5.23 ins.

83° and once fell to -1° . In spite of oceanic surroundings the February temperatures averaged 27° . At mid-month a cold spell carried the temperature below 10° for four days running; then a warm spell sent it up for another three to the high forties. The summer variability of the daily mean averages nearly 5° , the winter one nearly 8° . There is no hot weather, only mild weather and warm for most of the summer, and cold or cool for most of the winter. February had ten days that varied more than 10° from the mean.

VICTORIA, B. C.

But what type of temperature will obtain at the western border of North America, where the prevailing winds blow from the Pacific? Victoria, B. C., gives the answer (Fig. 19). Apart from the daily range

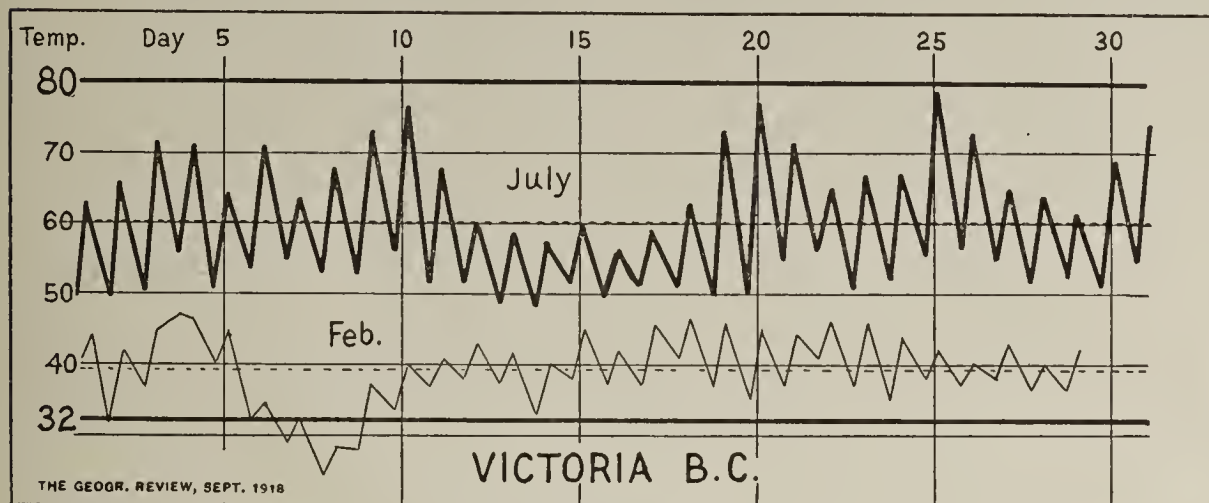


FIG. 19 (year: 1904)

July: mean 60°; range 14°; variability 3.2°; rainfall 0.48 ins.
 February: " 39°; " 5°; " 3.8°; " 3.93 ins.

of temperature the summer and winter graphs are not very different in variability, 3.2° in warm weather and 3.8° in cool. The greater range of summer temperature is due to the dryness of that season and its clear skies. Less than half an inch of rain falls in July to nearly four inches in February. The winter is cool; the summer warm by day and mild by night. Most of the winter and part of the summer have the tropical steadiness of diurnal oscillation which were called oceanic for the Bermudas and Key West.

The Pacific coast stations are all bathed in ocean air and have oceanic types of temperature, especially in the greater mildness and steadiness of their winter. But Newfoundland, though far out in the Atlantic, is almost as much bathed in land air as New York because its winds are usually from the west; and so it has a continental temperature. Victoria, on the other hand, had but one day in its winter month that differed as much as 10° from the mean and but seven that differed more than 5°.

WINNIPEG

Winnipeg, in about the same latitude as Victoria and St. Johns, is in the heart of the continent. We should expect a strongly developed continental temperature régime there, and we are not disappointed (Fig. 20). The temperature goes up to 93° and down to -36°. Only four afternoons had temperatures above freezing. The winter cold spells are severe, the summer ones perceptible. In summer the days are warm, occasionally hot; the nights mostly mild. The variability has the largest value observed in

this study, 5.6° in July and 11° in January. January had four days with a variation of more than 20° from the mean of the month.

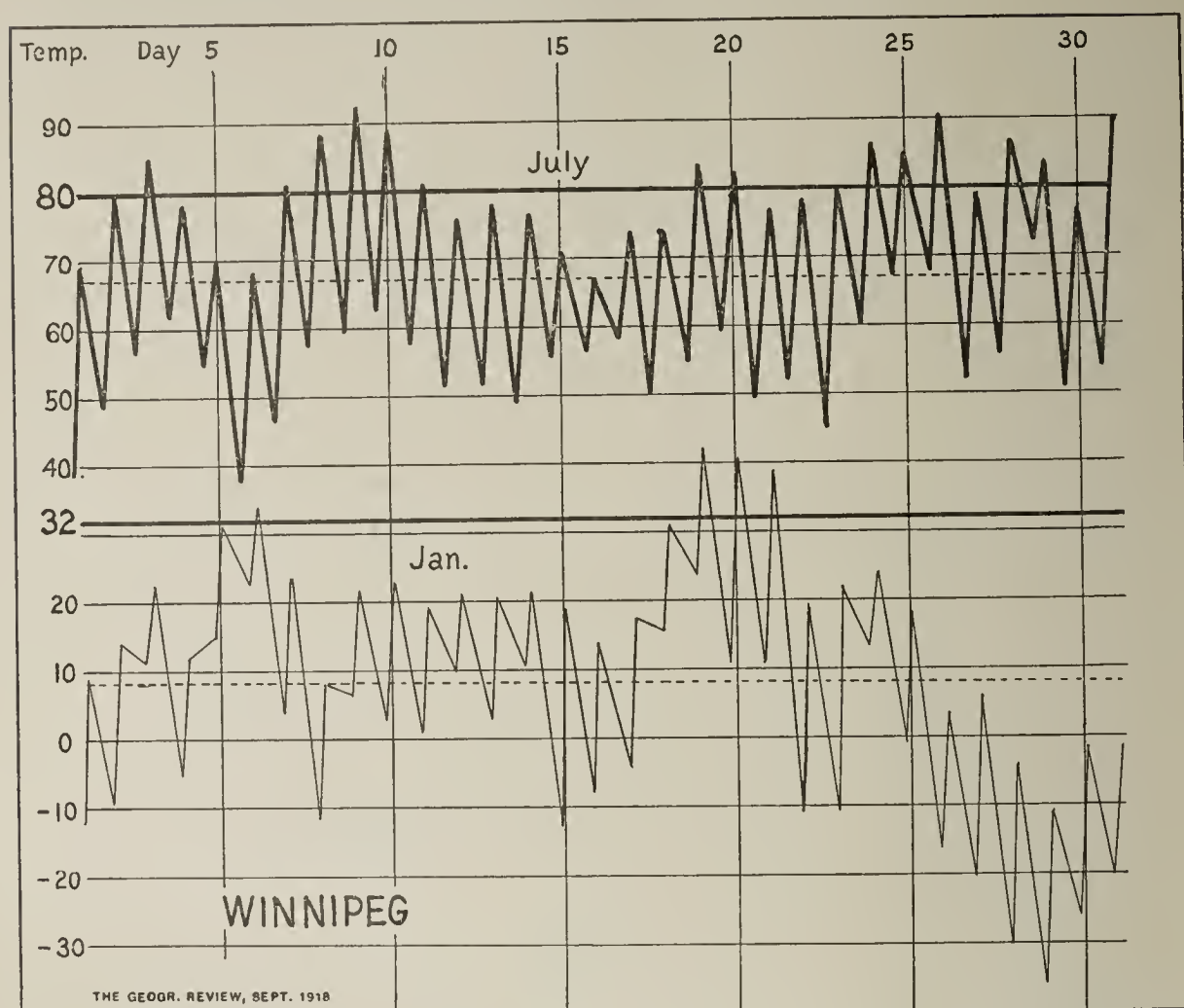


FIG. 20 (year: 1908)

July:	mean 67° ;	range 26° ;	variability 5.6° ;	rainfall 1.76 ins.
January:	" 8° ;	" 20° ;	" 11.2° ;	" 0.44 in.

TORONTO

February and July at Toronto (Fig. 21) do not differ much from the same months at Winnipeg, except for less severity of winter cold. Summer is warm to hot by day and mild to cool at night. The winter is cold. The variability is 3.5° and 8° , distinctly less than at Winnipeg. The case illustrates the practical working of variability. Winnipeg has a *mean* July temperature 4° cooler than Toronto; but, owing to its high variability, it saw the thermometer go up one day to 93° when at Toronto it was only 92° . Toronto lies five degrees farther south in latitude, and its temperature is doubtless influenced by the nearness to the waters of Lake Ontario.

SAN FRANCISCO

One of the most interesting temperatures studied is that of San Francisco (Fig. 22). The climate is of the mild, Pacific-coast type, milder even

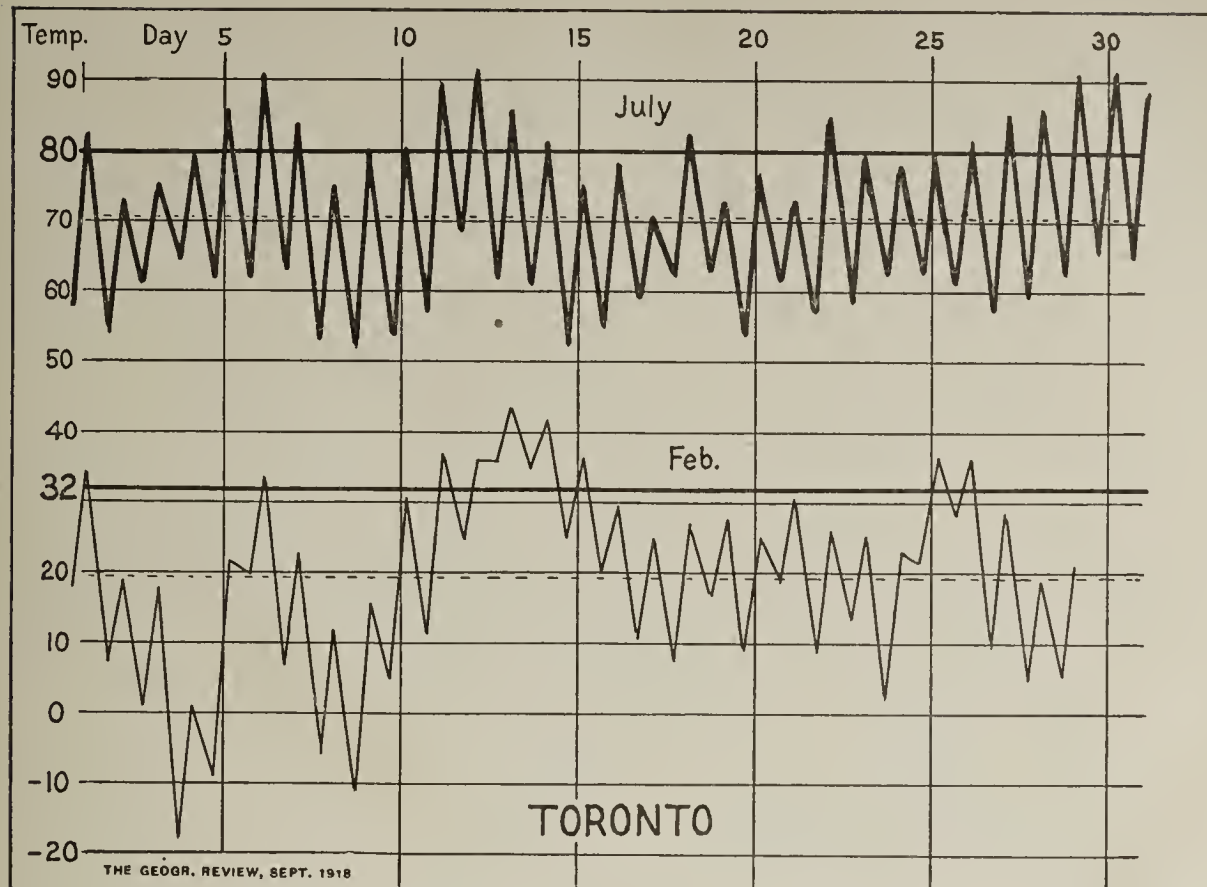


FIG. 21 (year: 1908)

July: mean 71°; range 22°; variability 3.5°; rainfall 2.97 ins.
 February: " 19°; " 16°; " 8.0°; " 3.77 ins.

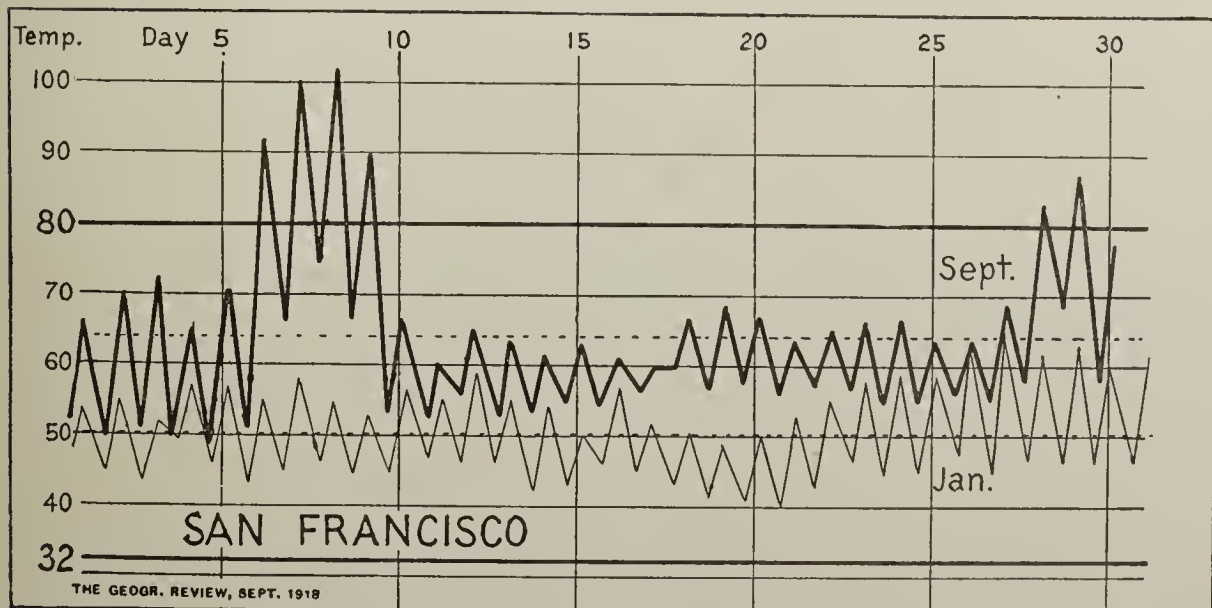


FIG. 22 (year: 1904)

September: mean 64°; range 14°; variability 6.1°
 January: " 50°; " 11°; " 2.4°

than Victoria's. September, the hottest month, is barely 10° hotter than January, the coldest month. For the most part the temperature oscillates from day to night almost with the monotony of the tropics, or of islands in the sea, but the warm month has unique freaks of hot weather. Usually the hot spells of the temperate zone are balanced by ensuing cooler or cold ones. Not so the hot spells of September at San Francisco. They rise from the uniform 60° weather to the 80's, 90's, and sometimes 100's for

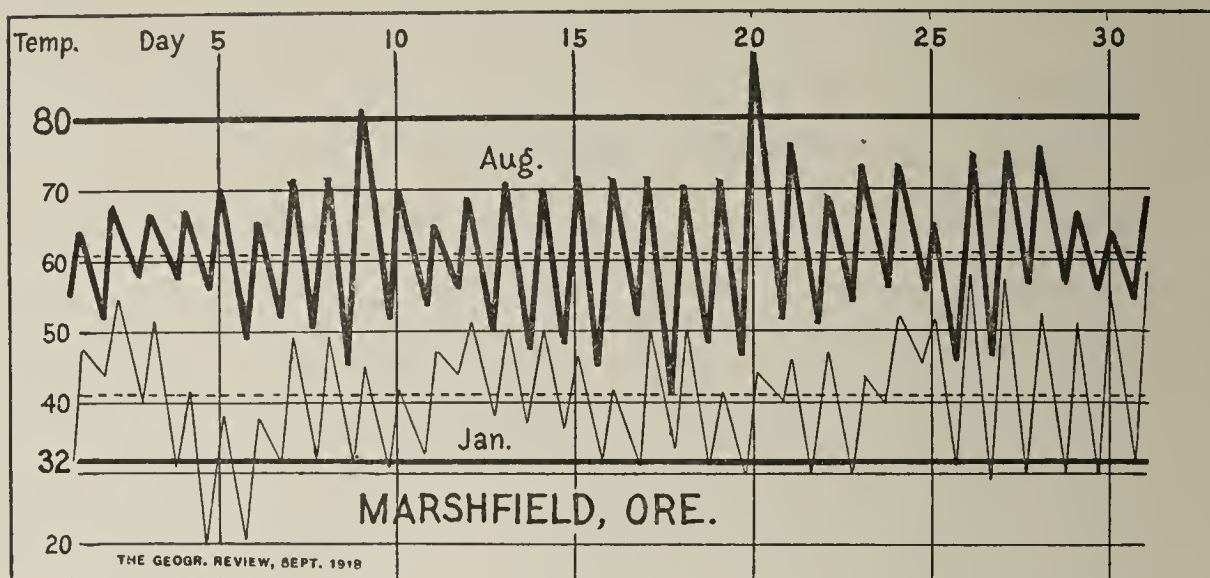


FIG. 23 (year: 1913)

August: mean 61° ; range 20° ; variability 2.0° ; rainfall 0.15 ins.
 January: " 41° ; " 15° ; " 3.8° ; " 12.06 ins.

a few days and then drop back again, to oscillate as before between 55° and 60° . There are no counterbalancing cold spells. These hot spells were unusually pronounced in 1904, but the year was not exceptional. The variability of September is of course increased by these hot spells. For a period of eight years it averaged 3.8° . Cold spells do not seem to occur at San Francisco, either in warm weather or cool, and the hot spells described are characteristic of warm weather only. In calling them unique I am comparing them only with other stations that were studied. They do not occur at Marshfield, Ore. (Fig. 23), or San Diego and Los Angeles, Cal. All of these have the even temperature of the oceanic climate, without these singular bursts of heat. They are not mentioned in McAdie's "Climatology of California."⁷ To the east of the Coast Range, at Red Bluff, at Sacramento, and at Fresno, in the Great Valley of California the temperatures show the continental heat of summer and cold of winter, although the annual range of temperature is not great; but the daily range has become considerable, and spells of both hot and cold weather are evident in both seasons.

⁷ Alexander McAdie: *Climatology of California*, *Weather Bur. Bull. L.*, U. S. Dept. of Agriculture, Washington, D. C., 1903.

PHOENIX, ARIZ.

The temperature régime at Phoenix, Arizona (Fig. 24), is a rather moderate example of temperate zone weather. The variability is 2° and 4.6° in the warm and cold months, respectively. This is distinctly greater

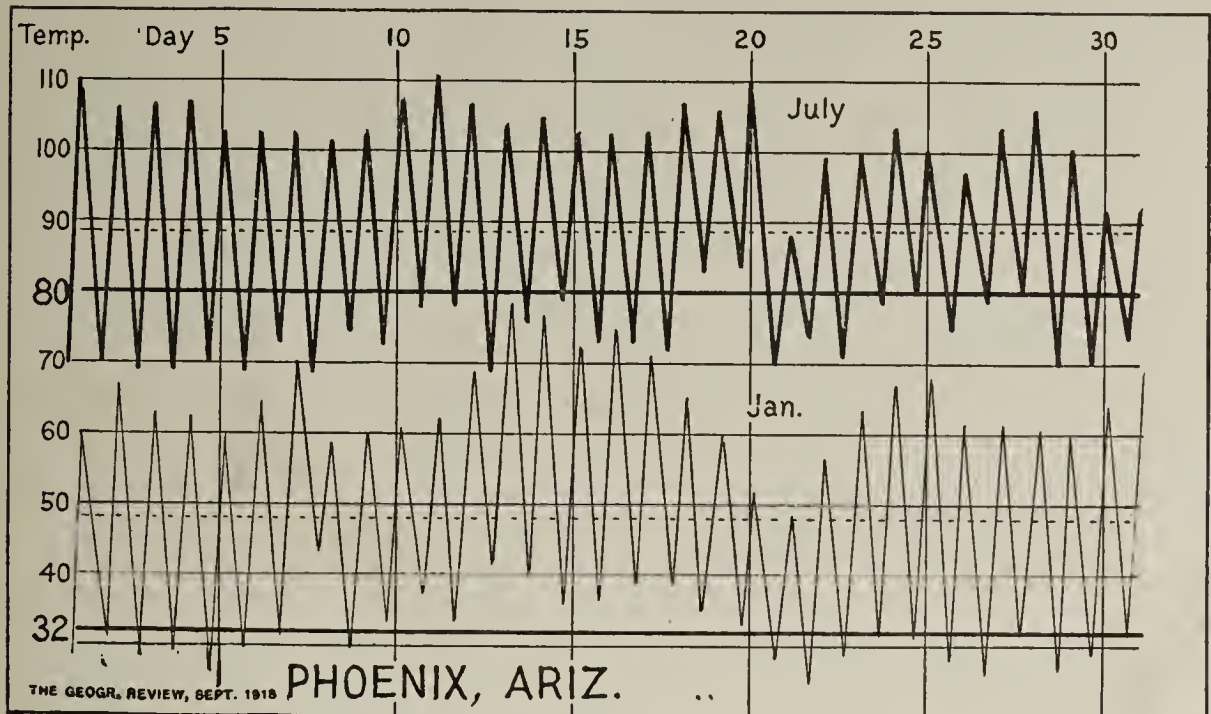


FIG. 24 (year: 1904)

July: mean 88° ; range 29° ; variability 2.0° ; rainfall 0.65 in.
 January: " 48° ; " 32° ; " 4.6° ; " 0.26 in.

than in the tropics but small for the temperate zone. Owing to the aridity of the region its daily range of temperature is very large; but the special feature is great summer heat. It was above 100° on all but six days of July, 1904, and three times reached 110° . The winter was not extremely cold. Fourteen times in January it fell below freezing.

SALT LAKE CITY

At Salt Lake City (Fig. 25) with a variability of 3.8° and 5.4° , the daily range of temperature is large in summer but much less in the rainier winter. The summer is rather hot, and the winter distinctly cold. Salt Lake City forms a transition type between Phoenix and St. Louis and other places in our humid east.

DENVER

Denver (Fig. 26) has much greater variability, 4.4° and 7.3° , but its summers and winters are in other respects about what we should get if we cooled the Phoenix weather about 20° . It is six degrees farther north in latitude and less arid. It has a hot summer and a cold winter.

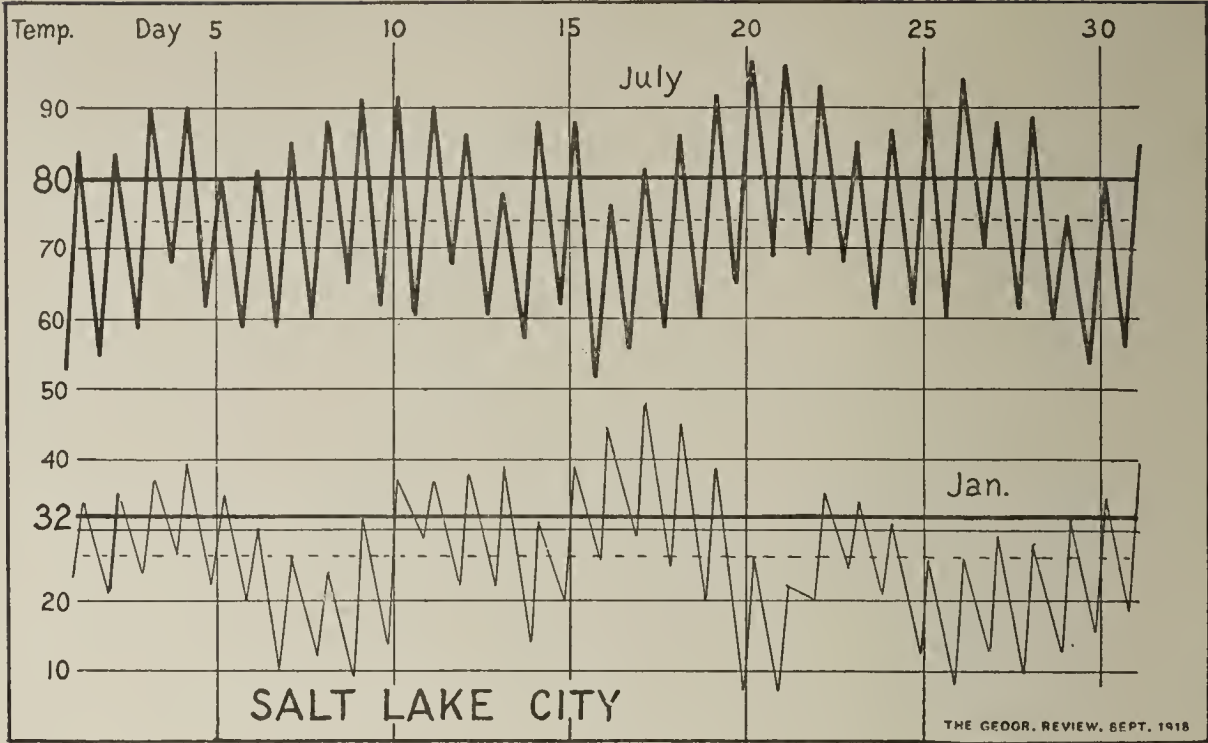


FIG. 25 (year: 1904)

July: mean 74°; range 26°; variability 3.8°; rainfall 0.65 in.
January: " 26°; " 16°; " 5.4°; " 1.45 ins.

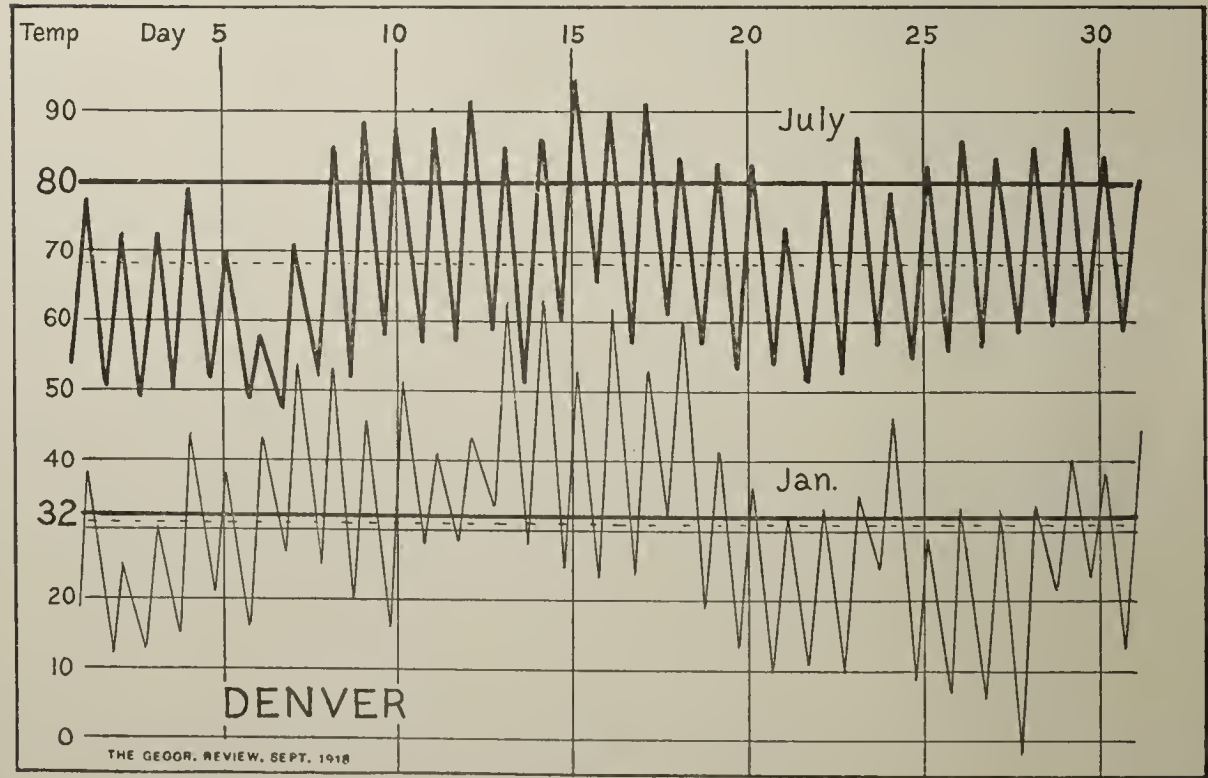


FIG. 26 (year: 1904)

July: mean 68°; range 27°; variability 4.4°; rainfall 1.6 ins.
January: " 31°; " 24°; " 7.3°; " 0.5 in.

ST. LOUIS

In a general way the temperatures of St. Louis (Fig. 27) are about like those of Winnipeg, Toronto, Chicago, Detroit, and Cincinnati, and also

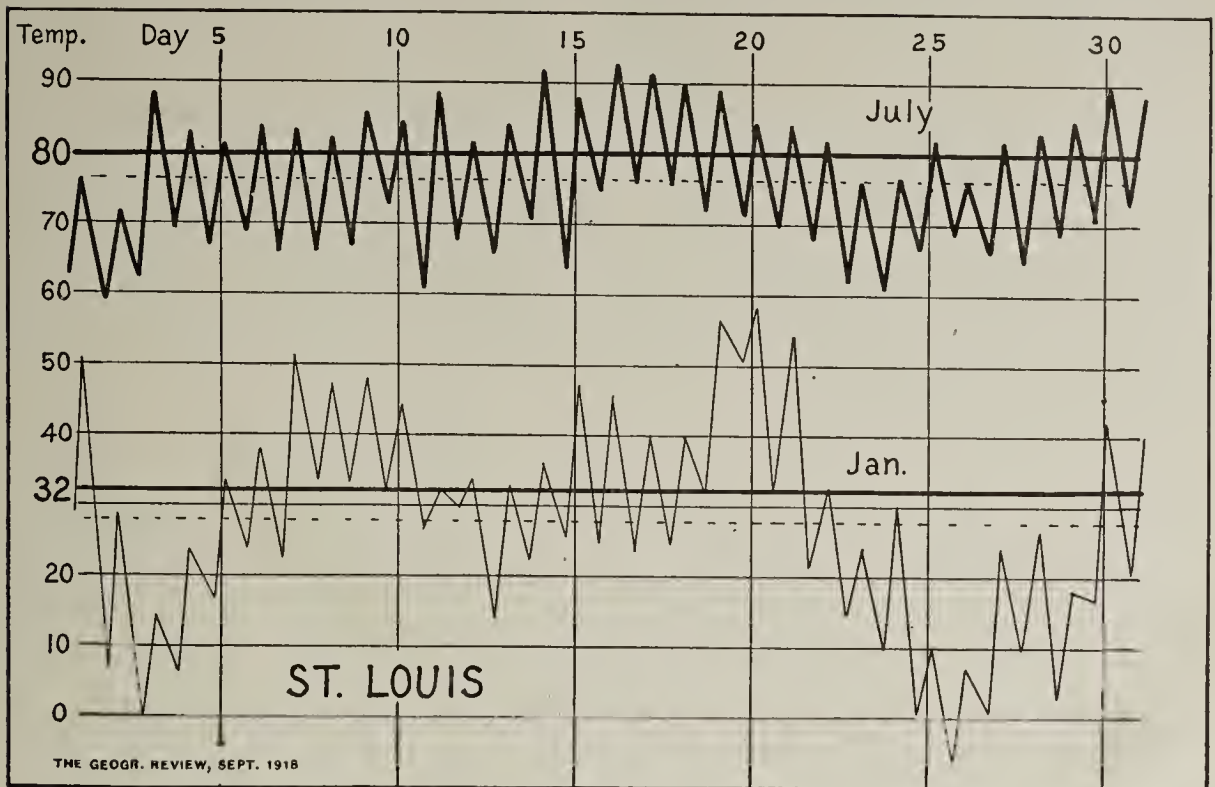


FIG. 27 (year: 1904)

July: mean: 76°; range 16°; variability 3.2°; rainfall 3.1 ins.
 January: " 28°; " 16°; " 10.4°; " 3.2 ins.

St. Johns, Boston, and New York. Summer is hot, winter is cold, and variability is very great, especially in the cold season, with a figure of 10.4°.

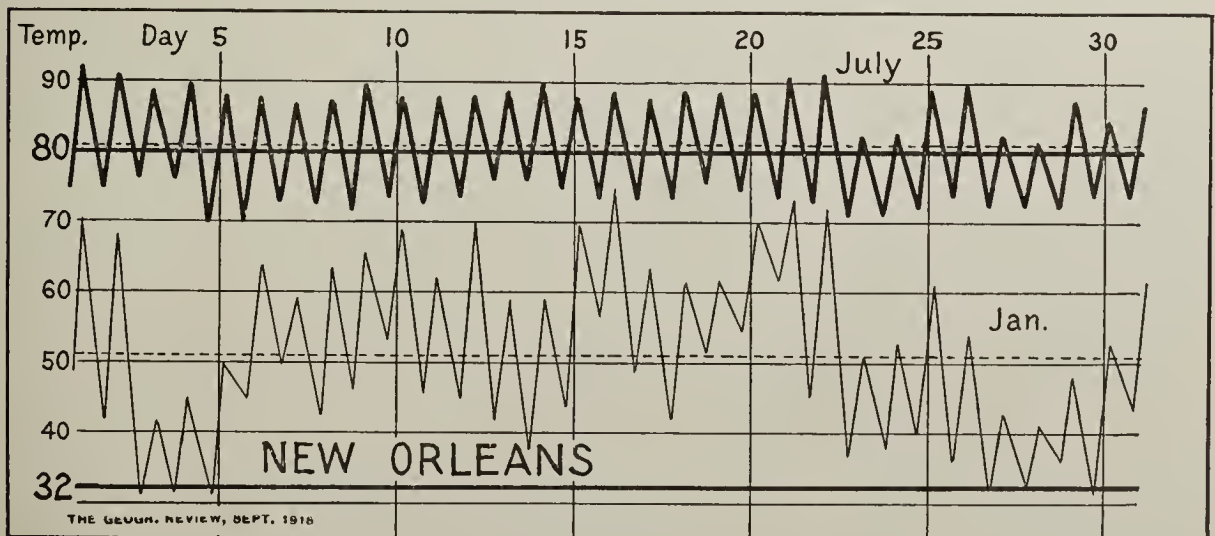


FIG. 28 (year: 1904)

July: mean: 81°; range 14°; variability 1.5°; rainfall 8.30 ins.
 January: " 51°; " 17°; " 7.0°; " 1.50 ins.

In 1904 January had five days that differed more than 20° from the mean of the month, fifteen that differed more than 10°, and twelve that differed

more than 5°. For the eastern United States it is the characteristic temperate zone weather, with somewhat variable summer temperatures and a winter of closely following mild and cold spells that are distinctly in contrast.

NEW ORLEANS

For the southern part of the eastern United States New Orleans is a rather extreme example (Fig. 28). The summer heats are considerable but of almost tropical steadiness, much like the temperatures at Havana though about a degree cooler. The winter is mild in temperature but strongly variable. Variabilities for New Orleans are 1.5° and 7°. No July day varies more than 4° from the mean of the month, but in January nine days varied by more than 10°.

FACTORS INFLUENCING DAILY TEMPERATURE RANGE

Some mention has been made in the comments on these diagrams of the varying daily range of temperature. It appears to be dependent to a great degree on the amount of clear sky, which in turn is limited by the rainfall, and this implies clouds. Again position near to the sea or remote from it matters a great deal. The places of least daily range of temperature in all America are:

	DAILY RANGE	
	<i>Summer</i>	<i>Winter</i>
Laurie Island (in far South Atlantic).....	3.5°	13°
Victoria, B. C. (Pacific coast of North America).....	14°	5°
Key West (Gulf of Mexico at southwest tip of Florida).....	10°	10°
Mollendo (Pacific coast of Peru).....	11°	10°
Prospect, Bermuda (island in North Atlantic).....	10°	11°

About ten degrees' difference between day and night characterizes these places. Ocean waters lend themselves to a uniform temperature, as they are slow to heat up and to cool off. Moreover the oceanic situation favors clouds and rain, as it is mainly from the ocean surface that the water is evaporated. Victoria, B. C., has about seven times as much rain in February as in July; so that there are many clouds, and the daily range of temperature in that season is only 5°. Laurie Island may have reversed conditions.

Next in order of daily temperature range come the nine seaports:

DAILY RANGE			DAILY RANGE		
	<i>Summer</i>	<i>Winter</i>		<i>Summer</i>	<i>Winter</i>
New York	13°	12°	St. Johns, Nfd....	19°	12°
San Francisco	14°	11°	St. Louis	16°	16°
Buenos Aires	18°	10°	Panama	16°	19°
Havana	16°	14°	Marshfield, Ore. ..	20°	15°
New Orleans	14°	17°			

Perhaps it would have been better to have called them eight seaports and St. Louis. They have been arranged in order of the magnitude of

the daily ranges, and St. Louis happens to fall among them. It appears to be an exception to a rule. The situation of these places by the sea makes them prone to cloudiness, which prevents the heating up by day and the cooling off by night that results in a diminished daily range of temperature.

The remaining thirteen places are all from continental interiors, regions that are arid, which means that clouds are scarce. Clear skies result in strong daily alternations of temperature. Six of the thirteen places are in the tropics and seven in the temperate zone. Great range of temperature has no relation to zone but belongs to continental interiors, just as small range belongs to places situated near the sea.

DAILY RANGE			DAILY RANGE		
	<i>Summer</i>	<i>Winter</i>		<i>Summer</i>	<i>Winter</i>
Dawson City	24°	15°	Toluca	30°	23°
Toronto	22°	16°	Santa Ana	24°	29°
16 de Octubre	25°	15°	Denver	27°	27°
Salt Lake City ..	26°	16°	Arequipa	23°	36°
Winnipeg	26°	20°	Phoenix	29°	31°
La Joya	22°	28°	Vincocaya	26°	43°
Cuzco	25°	27°			

This feature of the magnitude of the daily range crosses the variability of the daily temperature, which is very low in the tropics, on shore, and in the interiors alike in the miscalled temperate zone. The combination of daily ranges and variabilities comes to expression in the graphs that have been used to indicate the facts of actual temperatures throughout the length of America.

THE SLAVS OF NORTHERN HUNGARY*

By B. C. WALLIS

[With three separate maps, Pls. XI-XIII, facing p. 280.]

The Slavs of northern Hungary inhabit the mountainous country on the southern slopes of the northern Carpathian Mountains and reach in both the west and the east as far south as 48° N. latitude. The area may be divided into three main divisions: Slovachia in the west which marches with Moravia in Austria, the home of the Moravians who are akin to the Slovaks; Ruthenia-Slovachia in the centre, which borders Galicia on the north with the Poles in the west of Galicia and the Ruthenians in the east; and Ruthenia in the east which touches eastern Galicia and Bukovina, so that the Ruthenians lie on both sides of the Hungarian boundary. Within the confines of Hungary, Slovachia adjoins German Magyaria which lies south and west of the Danube and north of the Drave; Ruthenian Slovachia marches with Magyaria in Central Hungary, and Ruthenia lies north of Rumanian Hungary.

POPULATION

The total population of these three districts is approximately 4,000,000 and is contained within an area of 28,000 square miles, which is but sparsely inhabited in the more elevated northern fringe. The relation to Hungary as a whole is shown on Table I, p. 157 (accompanying "The Rumanians in Hungary"). The country mainly peopled by the northern Slavs is intermediate in size between the states of West Virginia and South Carolina. The average density of the population in northern Hungary is 147 per square mile, which is roughly three times that of the two American States, and exceeds that of Rumanian Hungary.

Slovachia contains the only three municipalities in the north of Hungary: Pozsony (Pressburg), on the Danube, has a population of 78,000 in an area of nearly 2,000 acres (cf. Passaic, N. J., with 72,000 inhabitants and 2,000 acres); Kassa contains 44,000 inhabitants, and has an acreage of 2,400; and Selmeczbánya, including Bélabánya, has 15,000 people spread over 2,200 acres. There are, however, many smaller townships, especially in the center and west; in fact, these small urban areas are more numerous than elsewhere in Hungary.

* This is the second of a series of four articles. The first, "The Rumanians in Hungary," appeared in the *August Review*; the third and fourth, "The Slavs of Southern Hungary," and "Central Hungary: Magyars and Germans," will appear in sequence. An explanatory note on the maps accompanies the first article.

THE PEOPLE OF NORTHERN HUNGARY

Details regarding the changes in the population of northern Hungary during the decade 1900-10 are given in Table I, which corresponds with Table III, p. 159, in the first article (in which Table II, p. 158, represents the population increase by nationalities in Hungary as a whole).

TABLE I—POPULATION CHANGES IN NORTHERN HUNGARY, 1900-1910
(Population in thousands)

	TOTAL POPULATION		NET INCREASE (b)-(a)	EXCESS OF BIRTHS OVER DEATHS	CHANGE (c)-(d)	ESTIMATED NET EMI-GRATION	MIGRATION WITHIN AUSTRIA-HUNGARY (e)-(f)
	1900	1910					
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
<i>Slovachia</i>							
Thousands	2,429	2,566	136	297	-161	-119	-42
Per cent.....	...	...	5.4	11.8	6.4	4.8	1.6
<i>Ruthenian Slovachia</i>							
Thousands	828	853	25	112	-87	-113	26
Per cent.....	...	...	3.0	13.3	10.3	13.4	3.1
<i>Ruthenia</i>							
Thousands	602	686	84	107	-23	-29	6
Per cent.....	...	...	13.0	16.6	3.6	4.5	0.9

Slovachia contains 2,500,000 people, whose rate of natural increase exceeds that of Rumanian Hungary, and who lost decennially 5 per cent of the population by emigration at a slightly faster rate than prevailed in Transylvania. In addition to the emigrants a third as many people migrated from Slovachia to other parts of the monarchy. With only one-third of the population of Slovachia, Ruthenian Slovachia lost almost an equal number by emigration, this loss being partly made up by internal migration. The emigration equalled the total natural increase of the population so that if there had been no influx of people the population would have been at a standstill. The rate of natural increase is higher still in Ruthenia; and, since emigration is only equivalent in proportion to that from Slovachia and there was a slight inward migration, Ruthenia shows a large increase in population during the decade. The net increase of the population during the last decade is not a unique phenomenon, for in Table II and Figure 1 it is indicated that the increase in Ruthenia has proceeded at an almost constant rate since 1880, and that the increase in Slovachia has always been intermediate between those for the other two districts. The Magyars form from one-quarter to one-third of the population in each district, and their increase in numbers was more rapid than that of the population on the average and was remarkably uniform, not only from decade to decade but as between the three separate areas.

Compared with the Magyars the distribution of the Jews shows important differences: in Ruthenia they form one-sixth of the population and they increased roughly at the same rate as the Magyars. In Ruthenian Slovachia they number one-tenth of the people and show but a slight tendency

to increase in numbers, while in Slovachia they amount to but one twenty-fifth of the inhabitants and tend to decline in numbers. The Jews must have steadily left Ruthenian Slovachia and Slovachia or else have become "official" Magyars.

The Ruthenians form one-sixth of the people in Ruthenian Slovachia, where they increase quicker than the total population but not quicker than

TABLE II—NATIONALITIES IN NORTHERN HUNGARY, 1880 AND 1910

NATIONALITY	SLOVACHIA			RUTHENIAN SLOVACHIA			RUTHENIA		
	1880	1910	INCREASE PER CENT	1880	1910	INCREASE PER CENT	1880	1910	INCREASE PER CENT
Thousands	2,091	2,566	22	743	853	15	446	686	54
Density per sq. mile	132	162	...	114	132	...	78	120	...
SLOVAKS									
Thousands	1,246	1,402	13	354	326	-8	1	2	...
Per cent	60	55	...	48	38	...	...	...	...
RUTHENIANS									
Thousands	1	1	...	120	149	24	209	287	37
Per cent .....	...	...	...	16	18	...	47	42	...
MAGYARS									
Thousands	608	912	50	146	249	70	98	178	81
Per cent	29	35	...	20	29	...	22	26	...
GERMANS									
Thousands	121	116	-4	52	36	-32	11	14	27
Per cent	6	5	...	7	4	...	2	2	...
JEWS									
Thousands	109	107	-2	66	70	6	62	111	80
Per cent	5	4	...	9	8	...	14	16	...

the Magyars in the district. They number more than two-fifths of the population in Ruthenia, and their total increase is but half the relative increase which has been made by Magyars and Jews in the same area.

The Slovaks show a relative decline in Slovachia and an absolute decline in Ruthenian Slovachia. They form 55 per cent of the population in the former district and 38 per cent in the latter. The Slovaks must be leaving these districts. The Germans show an absolute decline in the western and central districts, where they number about one-twentieth of the population; the decline in the central district is most marked (Fig. 1).

In Slovachia the Magyars have gained, while the Slovaks, Jews, and Germans have been steady. In Ruthenian Slovachia the Magyars have similarly gained, the Ruthenians have gained at less than half the Magyar speed, the Jews were steady, and the Germans have lost heavily in numbers. In Ruthenia the Magyars and Jews have made gains at approximately equal rates, the Ruthenians have gained at almost half their rate, and the small numbers of Germans are relatively steady.

A comparison of Figure 1 with Figure 1, p. 158, indicates that the whole population of Ruthenia is increasing more rapidly, while the whole populations of the Slovak districts is increasing more slowly, than the average for Hungary proper. The Magyars throughout the north have increased much more quickly than the Magyars on the average in Hungary proper. From a comparison between Figure 1 and Figure 2, p. 161, it is clear that Ruman-

ian Hungary is increasing in population more quickly than the Slovak lands, but more slowly than Ruthenia, and that while the Germans in Rumanian Hungary increased in numbers the Germans seriously declined in numbers in Ruthenian Slovachia and remained almost steady in Slovachia

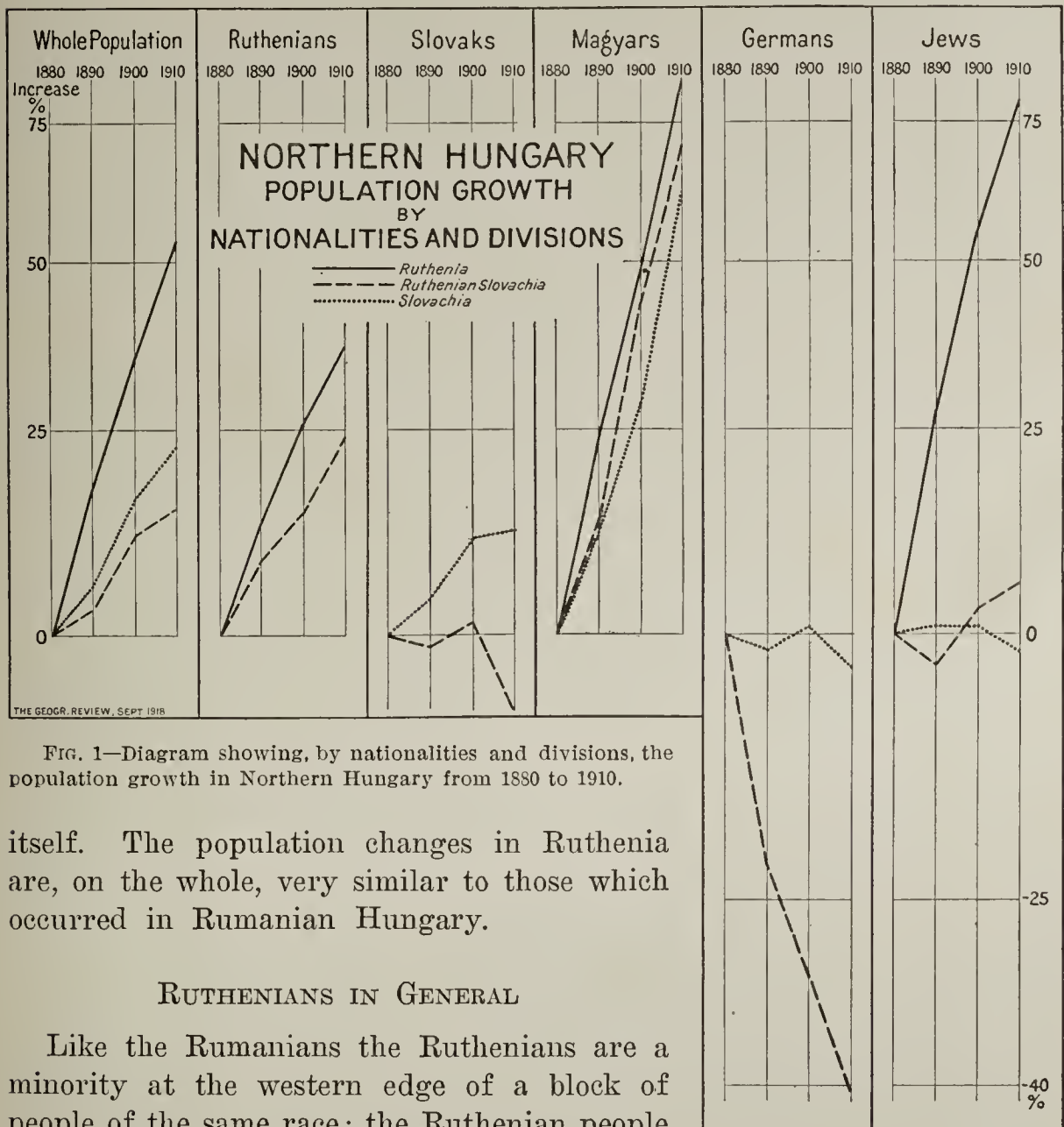


FIG. 1—Diagram showing, by nationalities and divisions, the population growth in Northern Hungary from 1880 to 1910.

itself. The population changes in Ruthenia are, on the whole, very similar to those which occurred in Rumanian Hungary.

RUTHENIANS IN GENERAL

Like the Rumanians the Ruthenians are a minority at the western edge of a block of people of the same race; the Ruthenian people extend eastward from Hungary across eastern Galicia, Bukovina, and into the southwest of Russia—the Ukraine. The 20,000,000 Ruthenians in Russia with 3,500,000 in Austria and 500,000 in Hungary make an estimated total of the Ruthenians in Central Europe of 24,000,000, which is a larger number than the present population of Hungary, approximately double the number of the neighboring Rumanians who live to the south, and about three times the number of the Czech-Moravian-Slovak group to the west. The Hungarian Ruthenians are a westward overflow of this people across the Carpathians, where they hold the high

ground of the Hungarian frontier from just east of the High Tatra to the Rumanian linguistic frontier; the central portion of this area occurs where the Carpathians are lowest and narrowest (Pl. XIII).

THE SLOVAKS IN GENERAL

The Slovaks of Hungary number about 2,000,000 and form about a quarter of the Czech group of Slavs. Of these Slovaks 1,400,000 live in Slovachia, half the rest in Ruthenian Slovachia, and the remained are scattered in linguistic islands over western and central Hungary. The Czechs are one of the most highly educated peoples in Austria-Hungary and with the Moravians have developed agriculture to the highest pitch it has reached in Austria; the Slovaks of Hungary may be termed the poor brothers of the Czechs.

THE NORTHERN SLAVS

It is a matter of considerable importance that these two Slav minorities, which meet in the area where the Magyars approach nearest to the Poles (Pl. XIII), form a connecting link with the Czechs of the west and the Little Russians of southern Russia and form a definite political and administrative bond between Austria and Hungary, since both governments have to face the problem of the future development of these Slav peoples. At the same time, it is important that the boundary between Slovak and Ruthenian occurs far to the east of the Moravian Gate, through which is the shortest line of connection between Prussia and the German districts in Austria.

In the west the northern boundary of the northern Slavs coincides with the political frontier of Hungary just where Hungary marches with Polish Galicia. In Plate XIII a portion of the county of Árva is marked as being the home of a people who are mostly Poles. This fact is based upon the census of 1910. There were no Poles officially recorded for that district in 1900, and the population of the county of Árva has decreased since that year; it may therefore be concluded that the people now called Poles were officially called Slovaks in former censuses. Otherwise the Poles remain in Austria and the Slovaks in Hungary; consequently, it may be held that the Carpathians have served as a better linguistic frontier between Poles and Slovaks than the mountains which fringe the Bohemian plateau have served as a linguistic boundary between Germans and Czechs. Yet this northern linguistic frontier of the Czech group of Slavs is better defined by physical features than the southern boundary of the Czech group of Slavs or the western boundary of the Rumanians or any of the boundaries of the Ruthenians. The southern boundary of the Slovaks within Hungary is indefinite; there exists neither a former historical boundary nor a present administrative boundary to which the southern boundary of Slovachia may be referred.

Similarly, while the linguistic boundary of the Ruthenians in Hungary is fairly precise, as there are but few Ruthenian islands, Ruthenia does not coincide with either a former kingdom, duchy, or margravate or a group of existing counties. Just as the linguistic frontier of the Rumanians crosses the left bank tributaries of the Tisza, so the southern linguistic frontier of the northern Slavs crosses the rivers which flow southwards to join the Danube or the Tisza. The Magyars, who are a traditional steppe people, hold the lowlands near these rivers and keep the Slavs in the hills. The boundary zone between the Slovaks and Ruthenians in Ruthenian Slovachia contains an element which is an additional complication, since groups of German villages almost connect the Magyars with the Poles of Galicia and almost separate many islands of Slovaks from the main body in Slovachia.

NATURAL INCREASE OF THE POPULATION

Passing from west to east the excess of births over deaths increases, and Magyars, Slovaks, Ruthenians in ascending order is the invariable rank of the three peoples in regard to natural increase of the population. The birth rate is, as a rule, high and, in the case of the Ruthenians the usual conditions are reversed, since the highest birth rate is accompanied by the

TABLE III—VITAL STATISTICS, 1900-1910

NATIONALITY	RATES PER 10,000 PER ANNUM			INFANT MORTALITY PER CENT OF LIVING BIRTHS	ILLEGITIMATE BIRTHS PER CENT OF TOTAL BIRTHS
	BIRTH	DEATH	NATURAL INCREASE		
Slovakia					
Slovaks.....	389	271	118	20	6
Magyars.....	353	245	108	20	7
Ruthenian Slovakia					
Slovaks.....	355	209	146	18	3
Ruthenians.....	413	249	164	18	3
Magyars.....	378	248	130	21	9
Ruthenia					
Ruthenians.....	468	284	184	18	4
Magyars.....	416	266	150	22	11

lowest rate of infant mortality. The proportion of illegitimate births is highest among the Magyars. Under the head of vital statistics the Ruthenians appear as the hardest race, the Slovaks come next, and the Magyars last. In comparison with similar conditions in Rumanian Hungary it appears that the Slavs of northern Hungary have more children than the Rumanians, fewer of them are born illegitimate, and approximately equal proportions survive the first year of life. The Ruthenian hill people make a better showing in these respects than the Rumanian hill people. The Magyars of the north do not evidence material differences from the Magyars of the east.

Reconsidering the curves in Figure 1 in the light of the information displayed in Table III it becomes obvious that the curves, in the main,

indicate the results of migratory movements of the population rather than the results of natural increase. It may be recalled from Table I that the proportion of emigrants is high, especially in the case of Ruthenian Slovachia. For example, the curve for Ruthenians in Ruthenia does not slope so steeply as the curve for the total population of Ruthenia, which means that the most vigorous race precisely in the area where its vigor is most manifest failed to increase as quickly as the average of the population of the district. It is requisite, therefore, to consider the migrations of the peoples in some detail.

EMIGRATION

Emigration in Ruthenian Slovachia equalled the excess of births over deaths, in Slovachia it amounted to two-fifths, and in Ruthenia to just over a quarter of the natural increase. In Slovachia the emigration of the Slovaks was excessive and that of the Magyars below their proportion of the

TABLE IV—ESTIMATED NET EMIGRATION, 1900-1910
(*Figures denote percentage*)

From:	(A) NATIONALITIES			
	SLOVAKS	RUTHENIANS	MAGYARS	GERMANS
	Slovachia 70	..	22	5
Ruthenian Slovachia...	62	13	20	5
Ruthenia.....	..	49	39	9
From:	(B) DESTINATIONS			
	To: Germany	Rumania	America	
	Slovachia 2	..	98	
Ruthenian Slovachia...	..	..	100	
Ruthenia.....	..	4	95	

population. In Ruthenian Slovachia the emigration of the Slovaks was even more excessive than further west, while that of the Ruthenians and Magyars was below the average for the district. In Ruthenia the emigration of Ruthenians was slightly above, and that of the Magyars slightly below the average rate. The heaviest losses by emigration, therefore, occur among the Slovaks. It is somewhat difficult to estimate losses by emigration among the Germans on account of the complication introduced by the German Jews; for example, in Ruthenia the Germans number 2 per cent of the population, while the German Jews amount to 10 per cent, and the emigration of Germans (i. e. Germans and German Jews in unknown proportions) was 9 per cent of the total emigration. Practically all the emigrants from northern Hungary go to America. Figure 2 indicates the areas where the emigration of different nationalities exceeded in proportion their relative numbers; the Slovak losses were very generally distributed. With relatively small losses by emigration the Magyars increased in numbers throughout northern Hungary at a notably high rate.

INTERNAL MIGRATIONS

In Slovakia there was a loss by movement into other parts of Austria-Hungary which amounted to a third of the loss by emigration. Since the Magyars increased more quickly than their rate of natural increase would appear to justify, it must be concluded that the recorded outflow of citizens represents the net difference between an inflow of Magyars and an outflow of Slovaks. It is known that Slovaks migrate across the border into

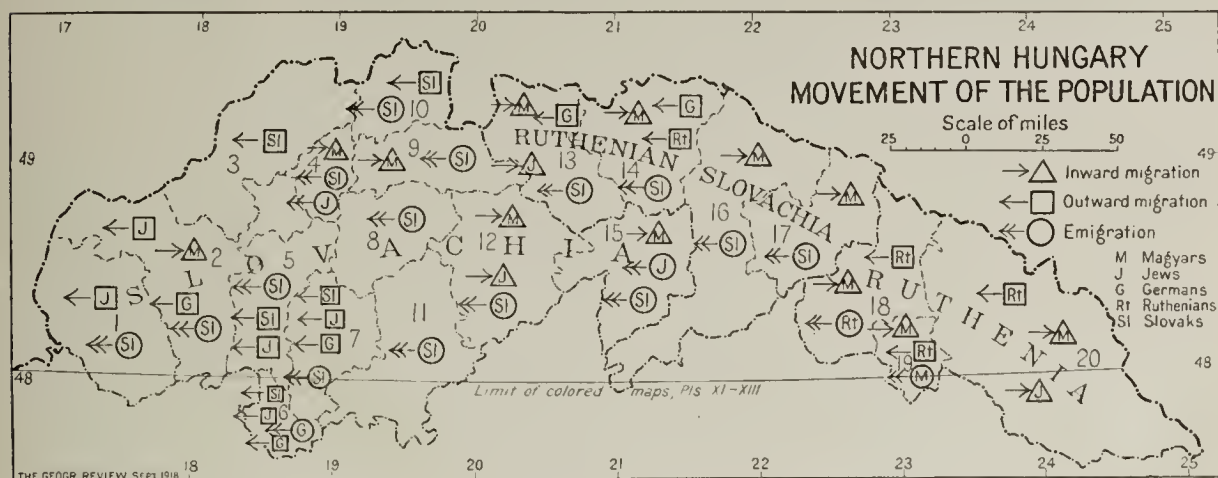


FIG. 2—Cartogram of Northern Hungary showing the movement of the population. Scale, 1:5,400,000.

For the names of the counties indicated by hair-line numerals see the key below. The counties are grouped to form three large divisions for the purposes of this article, Slovakia, Ruthenian Slovakia, and Ruthenia. The statistics in the tables and elsewhere in the text relating to these three divisions are based on the constituent counties as here shown.

Key to Counties: 1, Pozsony; 2, Nyitra; 3, Trencsén; 4, Turóc; 5, Bars; 6, Esztergom; 7, Hont; 8, Zólyom; 9, Liptó; 10, Árva; 11, Nógrád; 12, Gömör; 13, Szepes; 14, Sáros; 15, Abauj-Torna; 16, Zemplén; 17, Ung; 18, Bereg; 19, Ugocsa; 20, Máramaros.

Moravia and to Vienna; consequently the Magyar increase in Slovakia represents a gain in nationality figures as a result of an influx of Magyars. It has been suggested that there has been a deliberate falsification of the census returns—that people who are really Slovaks have been recorded as Magyars. In view of the facts here presented such a hypothesis does not appear to be necessary as an explanation of the changes which have occurred. The determinable facts appear to be sufficient to explain in the mass the changes in the proportions of Slovaks and Magyars.

In Ruthenian Slovakia there has been a gain by internal migration equal to the whole net increase of the population. In this area the known facts indicate a tremendous loss by emigration of the Slovaks and a great loss in numbers among the Germans. It is credibly asserted that some Germans and German Jews become Magyars between one census and the next, and such a "Magyarization" may account in part for the great increase of the Magyars; but the detailed figures for the villages show that the Magyar increase occurs very generally for each decade throughout the area. Under such circumstances the suggestion of "falsification" of the census returns does not appear to be necessary; this opinion is supported very

strongly by the steadiness of the Magyar curves for the three decades as shown in Figure 1; and by a comparison between the curves for the Slovak areas and those for Ruthenia.

In Ruthenia there was a slight gain in population by an inflow of outsiders, but the main cause of the increase lies in the exceptional fertility of the inhabitants. The Magyars gained most from the inflow from without.

A conspectus of the migratory movements of the people as they occurred in the several counties is provided in Figure 2. In Slovachia there was an excessive Slovak emigration from eleven counties out of thirteen, and there was in addition loss by internal migration from five of the thirteen counties. There was a notable inflow of Magyars into five counties, and one of Jews into one county. Each of the four counties in Ruthenian Slovachia had an inflow of Magyars and an excessive emigration of Slovaks, and in three of the counties the emigration was about three times the magnitude of the *inward* internal migration; while in two counties the emigration exceeded the natural increase of the population. These facts, as well as the presence of Ruthenians and Slovaks within the same administrative area, form the justification for the classification of these four counties separately from Ruthenia on the east and Slovachia on the west and south. They serve, further, to indicate a definite tendency, well shown in Figure 2, of the Magyars to extend from the Alföld towards the Carpathian boundary, just where the mountains are lowest and the plains extend furthest north.

In Ruthenia there has been both an inflow of Magyars and an outflow of Ruthenians in the case of each of the three counties; the Ruthenian emigration was excessive from one county, and the emigration of Magyars was excessive in the case of another county. Curiously enough this last county is the one with the greatest proportion of lowland. Emigration swamps the inward migration in each of these two counties.

It must be concluded, therefore, that the Magyars tend to move northwards from the center of Hungary into the whole of the area occupied by the northern Slavs, and that this movement has been steadily in progress at least since 1880 and is strongest just where its final success would serve to put a barrier of Magyars between the Ruthenians and the Slovaks. There is no evidence of a compensatory movement of the Slavs in the opposite direction from the hills to the lowlands as has been noted in the case of the Rumanians.

RELIGIONS

There are few adherents of the Eastern Church in northern Hungary. Some Magyars and Slovaks are Protestants, but the majority of the people acknowledge the authority of the Pope at Rome, either as Roman Catholics or as Uniates. As in Rumanian Hungary, there are some Magyar Uniates. Ruthenians are usually Uniates; roughly three-quarters of the

Slovaks are Roman Catholics. The differences in the Magyar religions are noteworthy; in Slovachia most are Roman Catholics, in Ruthenia most are Calvinists, and in the central area the two religions are professed almost equally. There is, therefore, a sharp division in Ruthenia on the basis of

TABLE V—RELIGIOUS ADHERENCE
(Percentage of total for each nationality)

NATIONALITY	ROMAN CATHOLIC	CALVINIST	LUTHERAN	UNIATE	JEWISH	OTHERS
<i>Slovachia</i>						
Slovaks	73	..	25	..	2	..
Magyars	69	19	4	..	5	3
<i>Ruthenian Slovachia</i>						
Slovaks	70	..	7	20	2	1
Ruthenians	2	..	..	95	2	1
Magyars	39	39	..	13	8	1
<i>Ruthenia</i>						
Ruthenians .....	..	..	..	94	5	1
Magyars	14	61	..	15	9	1

religion between the two peoples—Ruthenian and Magyar; but among the Slovaks only the Magyar Calvinists are separated by religious beliefs from the Slovaks.

ELEMENTARY EDUCATION

It has already been noted that while Rumanian Hungary enjoys singular treatment as regards education, the Rumanians are very illiterate. Ruthenia enjoys similar treatment; it contains a still larger proportion of children who do not attend school and the Ruthenians are still more

TABLE VI—ELEMENTARY EDUCATION, 1910

	PERCENTAGE OF TOTAL NUMBER OF CHILDREN BETWEEN 6 AND 14 NOT ON THE SCHOOL REGIS- TERS	PERCENTAGE OF THE UNREGIS- TERED WHO ARE OFFICIALLY EXCUSED FROM SCHOOL ATTENDANCE	PERCENTAGE OF THE SCHOOLS			
			(i) WHICH ARE:		(ii) WHERE THE LANGUAGE OF INSTRUCTION IS:	
			STATE OR COMMUNAL	CHURCH	MAGYAR	NON-MAGYAR
Slovachia	8	25	18	79	87	13 (a)
Ruthenian Slovachia ..	5	33	18	81	95	5 (b)
Ruthenia	34	20	34	66	84	16 (c)
Magyaria	12	21	35	62	99	1
Hungary proper	12	29	25	74	78	22 (d)

(a) 13 per cent Slovak. (b) 2 per cent Slovak, 2 per cent German. (c) 8 per cent Rumanian, 8 per cent Ruthenian. (d) 14 per cent Rumanian, 3 per cent German, 3 per cent Slovak.

illiterate than the Rumanians. It must, therefore, be concluded that the Ruthenians, like the Rumanians, are neglected educationally. They form 40 per cent of the population of Ruthenia, yet the language of instruction is Ruthenian in no more than 8 per cent of the schools; Rumanian is the language of instruction in an equal number of schools although the Rumanians are not one quarter so numerous. The proportion of state or communal schools in Ruthenia is well above the average for both Hungary proper and for Rumanian Hungary and is equal to that for Magyaria.

If the Ruthenians and Rumanians are neglected, the Slovaks are oppressed. Although a much smaller proportion of the children escape from attendance at school, the state or communal schools are below the average in number, and the number of schools where Magyar is the language of instruction is out of all relation to the Magyar proportion of the population; the discrepancy is greatest in Ruthenian Slovachia, precisely where the Magyar influx is most marked. Despite this oppression the Slovaks are not so illiterate a people as either the Rumanians or Ruthenians; like their kinsmen, the Czechs, the Slovaks are comparatively the best educated of the "subject races."

PUBLIC HEALTH

A disproportion in the medical service as between Magyar and Rumanian has previously been noted; the disproportion between Magyar and Ruthenian is even more marked. Ruthenians rarely receive attention from a

TABLE VII—PUBLIC HEALTH, 1901-1910

	PERCENTAGE OF DEATHS		CAUSES OF DEATH (PERCENTAGE)				NOT CLASSIFIED
	NOT TREATED	NOT CERTIFIED	TUBERCULOUS DISEASES	PNEUMONIA OR PLEURISY	CONGENITAL DEBILITY	SENILE DEBILITY	
	BY A PHYSICIAN						
<i>Slovachia</i>							
Slovaks	72	64	14	10	15	15	16
Magyars.....	54	50	16	7	15	17	20
<i>Ruthenian Slovachia</i>							
Slovaks	85	85	13	11	18	20	11
Ruthenians ..	90	90	21	9	20	17	7
Magyars.....	42	37	15	9	14	11	24
<i>Ruthenia</i>							
Ruthenians ..	98	98	12	12	20	14	4
Magyars.....	53	50	15	9	17	11	17

doctor either before or after death. In the case of the Slovaks, the Slovaks of Ruthenian Slovachia receive less consideration than the Slovaks of Slovachia, while the reverse is the case among the Magyars of these two districts. On the whole, deaths from tuberculosis are more frequent among

TABLE VIII—PUBLIC HEALTH SERVICE, 1910

DIVISION	NUMBER OF PEOPLE PER:			NUMBER OF FEMALES PER MIDWIFE
	PHYSICIAN	PHARMACY	HOSPITAL BED	
Slovachia.....	4,200	9,000	555	920
Ruthenian Slovachia	4,700	9,500	730	970
Ruthenia.....	7,400	14,000	680	1,030
Magyaria	1,900	7,600	270	540
Hungary proper.....	3,500	8,600	490	700

the northern Slavs than in Rumanian Hungary. Among the Magyars here, as in Rumanian Hungary, deaths from pneumonia and kindred ailments are not so frequent.

The proportion of deaths not officially classified among the main groups of causes of mortality is low where the medical service is poor, as in Rumanian Hungary, and this fact is a reminder that too much reliance can not be placed upon the official classification of causes of death.

The proportion of doctors, pharmacies, etc., to the population is notably low in Ruthenia, where each doctor, for example, serves four times as many people as a doctor in Magyaria. In each particular regarding the public health service the northern districts fall below the average for Hungary proper.

ECONOMIC CONDITIONS

Throughout the whole of the north of Hungary the women are relatively more numerous than the men. This fact is not surprising in the case of the Slovaks, from among whom there is a large emigration; yet it is somewhat unexpected in the case of the Magyars, among whom the disproportion is least. Children below 6 years of age are more numerous, because

TABLE IX—ECONOMIC CONDITIONS
(*Rural Communities*)

NATIONALITY	NUM- BER OF WOMEN PER 1,000 MEN	AGE GROUPS (PERCENTAGE)				PERCENTAGE OF POPULA- TION OVER 6 YEARS OF AGE ILLITERATE	HOUSES (PERCENTAGE)			PEOPLE PER HOUSE
		0-6	6-14	15-60	OVER 60		STONE OR BRICK	TIMBER	WITH THATCHED ROOFS	
Slovachia										
Magyars	1,025	16	20	55	9	21	19	8	39	5.4
Slovaks.....	1,130	17	22	53	8	30	24	60	21	5.6
Ruthenian Slovachia										
Magyars	1,075	16	22	55	7	28	32	3	49	6.0
Slovaks.....	1,115	18	24	50	8	45	16	64	33	4.9
Ruthenians...	1,140	18	26	49	7	70	10	88	45	5.3
Ruthenia										
Magyars	1,046	16	22	55	7	28	4	28	33	6.0
Ruthenians...	1,075	20	22	52	6	78	1	98	56	4.8

of the greater fertility already noted; and old people, over 60 years of age, are less numerous proportionately among the northern Slavs than in Transylvania.

The Magyars have the best houses and the Ruthenians the worst; more than five Ruthenian houses out of six are thatched, i.e. are covered with a vegetable covering, which frequently presents an appearance of great untidiness. The proportion of timber houses depends largely upon the locality; where timber is not easily obtained the majority of the houses are built of dried clay; the Slavs live among the forested hills and use timber for the house walls, but they appear to be too poor to use anything but the crudest thatch for the roofs. On the average the Magyar house contains six people, while a Slav house contains only five; both these figures exceed the number of occupants, just over four, for Transylvanian houses.

RAILWAY TRANSPORTATION

Railway transport in Ruthenia resembles the provision in Transylvania; in the Slovak districts it is similar to that of the Rumanian fore-

TABLE X—RAILWAYS

DIVISION	MILEAGE	
	PER 100,000 INHABITANTS	PER 100 SQUARE MILES
Slovachia.....	65	10
Ruthenian Slovachia.....	63	9
Ruthenia.....	48	6
Magyaria.....	50	13
Hungary proper.....	71	10

lands. The service is strategic and political in its purposes and, as in the east, fails to provide facilities for local traffic and communications.

SUMMARY

The north of Hungary is a land of three nationalities with a sprinkling of Germans, Jews, and outcrops of Rumanians near Máramarossziget and of Croats near Pozsony. In the main there is one language in use in the schools and the people are either Western Catholics or Protestants. The Jews are relatively more numerous in Ruthenia than anywhere else in Hungary.

The Ruthenians are a small fragment of an eastern people, and they are not articulate politically. Hill men in a forested region they are conservative and, when modern facilities of transport for timber took away much of their habitual occupation of lumber haulage along the roads, they had considerable difficulty in adjusting life to the new conditions. They are a hardy, illiterate, neglected people, whose small numbers render them of little account politically in Hungary, while their unbroken connection through the Ruthenians of Austria with the Little Russians of the Ukraine gives them considerable importance at the present juncture.

The Slovaks are probably the least important, the least capable economically, and the least articulate politically of the three peoples who make up the Czech-Moravian-Slovak group of Slavs, a group which is limited within Central Europe to the confines of Austria-Hungary. They are pastoralists and growers of root crops with a local reputation as makers of cheese from sheep's milk. While Ruthenians and Rumanians have been politically despised and administratively neglected the Slovaks have been actively oppressed by the Magyar bureaucracy, and the strain of the Magyar "progress" has been felt most severely in Ruthenian Slovachia.

The linguistic boundary between the Magyars and the northern Slavs lies in a zone near the southern edges of the Carpathians and leaves the Slavs in the occupation of numerous valleys without close and easy connection one with the other and, therefore, without the geographical impetus

NORTHERN HUNGARY

Scale 1:2 000 000
0 10 20 30 40 50 miles

Geographical Data
Compiled by B. C. Wallis

Boundaries
--- National
--- County
--- District and Municipality

RELIEF

feet	meters	feet	meters
0-330	0-100	600-2000	200-600
330-660	100-200	2000-3300	600-1000
		3300-5300	1000-1600
		over 5300	over 1600



NORTHERN HUNGARY

Scale 1:2 000 000
0 10 20 30 40 50 miles

Geographical Data
Compiled by B. C. Wallis

Boundaries
--- National
--- County
--- District and Municipality

NATIONALITIES

Poles 50 - 95%
Germans 50 - 95%
over 95%

Slovaks 50 - 95%
over 95%
Magyars 50 - 95%
over 95%

Ruthenians 50 - 95%
over 95%
Rumanians 50 - 95%
over 95%
Croats 50 - 95%

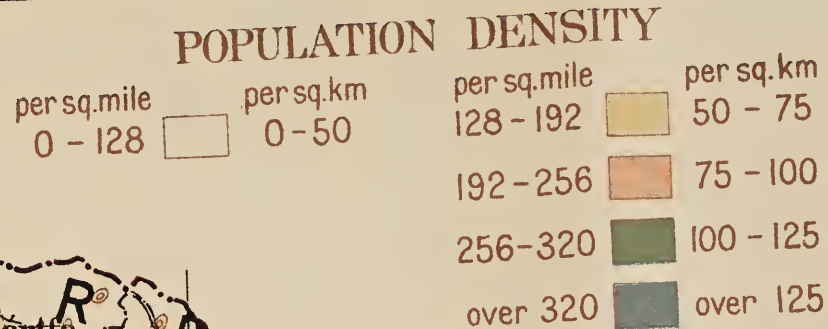


NORTHERN HUNGARY

Scale 1:2 000 000
0 10 20 30 40 50 miles

Geographical Data
Compiled by B. C. Wallis

Boundaries
--- National
--- County
--- District and Municipality



of easy communications towards racial and national unity. The disintegrating effect of the Magyar possession of the lowland is well illustrated by the insular character of the areas in Ruthenian Slovachia where the Slovaks number more than 95 per cent of the inhabitants (Pl. XIII). The unsettled nature of this region is signified by the fact that between two censuses a comparatively large number of villages change their racial character without changing the proportional division of the people among the churches. A village once Magyar, becomes Slovak, and perhaps changes back to Magyar; other villages change from Slovak to Ruthenian or vice versa; but while the nationality changes the religion remains constant. "Magyarization" of the Slovak lands appears to have taken the form of a steady infusion of Magyars by migration, combined with considerable political oppression by Magyar officials; it has appeared to be much more successful than it has been in reality since it has coincided with Slovak emigration on a large scale.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

News from Stefansson. The Society has received news of the recovery of V. Stefansson from his serious illness and of his plan to return to this country from Fort Yukon some time early in October. It has been arranged to have him lecture at Carnegie Hall immediately after his return under the joint auspices of the American Museum of Natural History and the American Geographical Society. His lecture will be fully illustrated and will be one of the most noteworthy numbers on our program for the year. The preliminary account of his five years' Arctic work included in Stefansson's letter will be published in full in the next number of the *Geographical Review*, together with a map of the region which he has recently explored.

NORTH AMERICA

The Fall of a Meteor in Northern Canada. Unusual descriptions of the fall of a meteor have been received from Vilhjalmur Stefansson in a letter dated Fort Yukon, Alaska, July 8th, 1918. The occurrence took place on or about February 26th, 1918. At the time Stefansson was at Herschel Island ill with pneumonia and he was unable to make notes or secure memoranda. His description is as follows:

"Between 7 P. M. and 9 P. M. the interior of the building in which I was lying was suddenly lighted so brilliantly that shadows were clearly cast in places other than those where the light of the brightly burning lamp could have thrown them. Turning in bed as quickly as weakness permitted, I saw the window (which faced south) brightly lit. There were two persons in the room. One of these, Mr. Leo Wittenberg, ran to the window, and the other, an Indian boy, ran outdoors. Mr. Wittenberg said that from the window he could see pressure ice at sea to the south, a distance of a mile or more, about as clearly as he could have seen it by daylight. This was confirmed by the Indian boy, who, on being questioned, added the information that the disc of the meteor was about the size of the moon; that the light, judged by the visibility of distant objects, was about as bright as daylight, and that the meteor disappeared in the direction of Shingle Point, southeast or a little south of southeast. Every one at Herschel who had a house with a window saw the light, but few if any saw the meteor itself, except our Indian. Others, as well as he, noted that there was a luminous tail for several minutes. No one reported any sound. Mr. Harding, the Hudson's Bay Company factor, and several others at first took the sudden glow outdoors to be the bursting into flame of the mission buildings near by.

"On arriving in the Porcupine valley in April I was greatly interested to learn that what was apparently the same meteor had been seen there by several persons. Those who gave me the most accurate accounts were Constable Claude B. Tidd of Rampart House and Mr. A. H. Anthony of the same place. These two men were on the return journey from a Royal Northwest Mounted Police patrol from Rampart House to Fort Macpherson and were camped in a mountainous country on the Bell-Porcupine portage. There are no accurate surveys even of stream courses in this country; the relation of the Bell to the Porcupine is not even approximately as shown on the maps. Mr. Anthony estimates they were from 95 to 100 miles west (perhaps a little north of west) of Macpherson, 15 miles west of their crossing of the Bell and 40 miles east of the point where the portage trail strikes the Porcupine.

"The date was probably the 25th of February, though it might have been a day later or earlier. Camp had been pitched for the evening, the tent door facing north. The sky was clear and the moon near the full. It was about nine o'clock when the meteor was seen. It became incandescent at a point a little west of true north and about 60 degrees from the horizon. Its course was slightly curved and made an angle of a little under 45 degrees with the horizon. It took about a second to fall and disappeared behind a mountain that loomed high in the northeast. Some part of its course from the point of appearance and another portion near the mountain were not illumined after its passage, but the middle third of the course was defined by a cigar-shaped

'cloud' of illuminated 'smoke' of a puffy appearance resembling thick, white summer clouds or the puff of the white smoke from a big gun. This gradually became less bright but persisted for at least five minutes, and probably considerably longer. After an interval, that Mr. Anthony estimates at four minutes from the disappearance of the meteor, three loud 'rolls of thunder' were heard to the east or northeast. These resembled summer thunder in character but were briefer. They were distinctly not single booms, as those of a big gun.

"On arrival at Fort Yukon I found testimony in agreement as to the date and appearance of the meteor save in the matter of direction. On the evening of February 26th, between 7 and 9 P. M. the mail carrier was on his way from Circle to Fort Yukon about 8 miles upstream from Fort Yukon. He saw the meteor appear in the east considerably less than 45 degrees from the horizon and disappear in the east-southeast right over the tree tops, not over 5 degrees from the horizon. It burst into myriad fragments. The 'tail' it left seemed to be produced by the burning of the sphere 'on the edges,' and it disappeared almost immediately. The latter statement is contrary to the observation of Messrs. Tidd and Anthony, but possibly this was because of the cloudy weather on the Yukon, whereas the others observed the meteor in a clear sky. The mail carrier thought the meteor to have been a little smaller than the moon when full, but the light was equal to daylight and pure white. He heard no noise when the meteor burst. He and his companion, whom I have not seen, seem to have been the only white men who saw it near Fort Yukon, though all saw the light it created. Knowing little of such phenomena, the two men made a compact that they would tell no one of what they had seen as they feared to be ridiculed or called liars. When, however, they learned that the light had been seen in nearly every house at Fort Yukon, they also told their version of the story.

"It will be noted that if a line be drawn roughly southeast from Herschel Island in conformity with the statement of our Indian boy, and northeast from the camp of Messrs. Anthony and Tidd, these lines will meet in the vicinity of the Mackenzie delta. I have consequently taken pains to see Mr. William Johnson, fur buyer, who has been in the Delta since February. He tells me that the meteor was seen to fall to the eastward by persons who were in the Delta about 100 miles north of Macpherson and to the south of other persons who were about 175 miles north-northeast from Macpherson. He did not trouble to get accurate directions, so one can only say that the meteor probably fell just west of, or into, the Eskimo Lakes east of the delta. Further information should enable us to determine with near exactness where it fell, even should it prove that no one actually saw it strike. From the delta Mr. Johnson reports three 'rolls of thunder' and the breaking up of the meteor into innumerable fragments before striking the ground."

Eighteenth Century Explorations in the Middle-West: the Routes of the Verendryes. Five years ago considerable excitement was created by the finding at St. Pierre, South Dakota, of the lead plate deposited in 1743 by the sons of that intrepid explorer, the Sieur de Verendrye. More recently (1917) the pioneer voyages of the famous French-Canadian family in what is now United States territory have been commemorated by the establishment of the Verendrye National monument in the State of North Dakota. The monument takes the form of a reservation of about 250 acres surrounding a height locally known as Crowhigh Butte overlooking the Missouri River at the confluence of the Little Knife River (latitude 48°).

The explorations of the Verendryes, father and sons, were primarily undertaken in search of the great geographical objective of the time—the "Western Sea." In the first half of the 18th century European nations were engaged in a lively contest to reach the west coast of North America. Spain having successfully colonized most of the New World was trying to reach California across the desert of the southwest. England had planted settlements along the Atlantic seaboard and established fur stations about Hudson Bay. Her navigators, led by Robert Crow (1737) and Captain Middleton (1742), were now endeavoring to find a northwest passage to the South Sea. From the west, Russia sent out the great Behring who discovered the Strait into the Arctic (1728), and in his second voyage coasted along Alaska (1741). The Verendryes' work was a part of this international race to the west coast. France already held most of temperate North America. The Mississippi was a well traveled trade route from Gulf to Great Lakes. Louisiana had some 6,000 settlers. It was most desirable that France should establish herself on the western sea. The Verendrye proposals met with approval from officials in Montreal, though the French Government furnished no financial support.

Verendrye began his search in 1731 by proceeding from Lake Superior to the Rainy

River. Thence repeated misfortune impeded his progress, though by 1734 he had erected Fort Marepás on Lake Winnipeg. In 1738 he ascended the Assiniboine, built Fort La Reine, today the site of Portage La Prairie, and being there joined by another party journeyed on via the Turtle mountains to a village of Indians named "Mantannes." Here the course followed becomes obscure. Verendrye says the village was on a river in latitude $48^{\circ} 12'$. At a second village of the same tribe one of Verendrye's sons and a companion saw the "river of the Mantannes," unquestionably the Missouri. The exact location on the river, however, is still a matter of doubt. Most investigators, identifying the Indian tribe with the Mandans, a people later made well known by Lewis and Clark, place the spot about the confluence of the Heart River with the Missouri (latitude $46^{\circ} 50'$). A different solution has recently been propounded by Orin G. Libby ("Some Verendrye Enigmas" and "Additional Verendrye Material," *Miss. Valley Hist. Rev.*, Vol. 3, 1916) who, identifying the Indian tribe with the Hidatsa or Gros Ventres, believes the locality to be further north: his identification is the site of the National Monument.

The exact determination of this point is of importance, for not only does it give the terminus of the first journey of the white man into this section of the country but it establishes the starting point of the still more notable trans-Missourian travels of the Verendrye sons, the course of which is still a matter of debate. The problem of their journey may be briefly stated.

On July 23, 1742, the son of Verendrye usually known as the Chevalier and a brother left the Indian village on the Missouri in pursuance of their quest for the Western Sea. According to the Journal of the Chevalier they proceeded in a general south-westerly direction, meeting and traveling with a succession of friendly Indian tribes. In January they came in sight of mountains across which, according to their Indian informants, lay the road to the sea. In the meantime Verendrye had discovered that it was a "known sea," its shores being inhabited by a white people whom he recognized as Spaniards from the descriptions of the Indians. It seems probable that he was in a region that remotely felt the influence of the Spanish traders of Santa Fé. But the way to the sea was blocked by a warlike tribe at enmity with Verendrye's friendly Indians. The whole party retreated in an east-southeasterly direction. Reaching a river, which he says was the Missouri, Verendrye stayed for a time with the local tribe. There, before his departure to the original starting point, he deposited on March 30, 1743, the lead plate of the recent discovery.

How far west did Verendrye go; what were the mountains whence he turned back from his search? Parkman, who has been generally followed, identified the mountains with the Big Horn Range of the Rockies (Francis Parkman: *A Half-Century of Conflict*, 1892. See Vol. 2, map facing p. 43). The interest aroused by the discovery of the plate has stimulated new inquiry into the problem. The history of the Verendrye family and their discoveries is discussed at length in the *South Dakota Historical Collections*, Vol. 7, 1914 (pp. 89-402). Two maps accompany the discussion: that by Charles DeLand shows as alternative a longer route reaching as far west as the Powder River and the foot of the Big Horn Range and a shorter route to the Black Hills. Doane Robinson who furnishes the second map believes the shorter route to be the only possible interpretation whereby times and distances can be reconciled with Verendrye's arrival at the spot on the Missouri (St. Pierre) where the lead plate was found. Orin G. Libby, however, questions that this locality represents the original burial place of the plate. He suggests instead a point on the North Platte River and believes that the expedition reached as far as the Big Horn Mountains or the northern end of the Laramie Hills. If Mr. Libby's interpretation of the starting point as the site of the National Monument be correct, argument for the longer route appears to be strengthened. But the question is still far from being solved with certainty. Further research might be continued with profit particularly, as Mr. Libby suggests, along the line of investigation into Indian tribal records for the region west of the Missouri.

A Dry Thunderstorm in California. A remarkable electric storm occurred in Trinity Co., Cal., on Aug. 1, 1917. The spring and summer had been the driest on record. No rain, or practically none, accompanied these lightning flashes, and 80 forest fires were reported. For almost all of August, one-half of the men in the Forest Service in that vicinity were fighting these fires. One forest warden reported that the lightning struck 150 times in an area approximately five miles square, and another reported that the country "looked like one vast Christmas tree, as various trees blazed into light on being struck" (*Mo. Wea. Rev.*, Vol. 45, 1917, p. 500).

R. DEC. WARD.

EUROPE

A Study in City Geography; Lausanne. Lausanne stands near the center of the northern or more frequented shore of the Lake of Geneva. Its position is coincident with a change in the morphology of the shores. To the east the shore is bold, precipitous; westward where the coast begins to swing to the southwest its contours are softer, glacial deposits cover much of the surface, fluvio-lacustrine terraces mark ancient levels of the lake. Inland the horizontal strata give a characteristic tabular topography. To the east the country is very different: the rocks sharing in the outermost folding of the Alps show the accidented topography of the mountain.

Lausanne may therefore be considered to lie at the foot of the great barrier of the Alps. But it also lies at the exit of one of the great passageways through that barrier, the road of the Rhone and the Simplon and Great Saint Bernard Passes. Northwestward from Lausanne the route continues across the Jura following a great transversal fault to Pontarlier and thence by three roads—through Langres, Dijon or Chagny, a little farther south,—gains the Paris Basin. This is a route of memorable history. It was one of the important arteries of the Roman system. In the days that followed the fall of the Empire Lausanne was preserved as a town of the road. Kings passed through on their way to Italy and prelates on their way from Rome. In 1275 Pope Gregory X and the Emperor Rudolph of Hapsburg met here for the consecration of the new cathedral. The Council of Basel held its last session in Lausanne; there was founded here in 1537 the first Protestant Academy for those of French tongue. While Lausanne attracted a spiritual and intellectual life it also attracted a commerce that enriched its burghers. Routes following the great arc of the Alps along the Swiss plateau passed through Lausanne towards Geneva and the Mediterranean. Lausanne is a town of the cross roads.

The coming of the railway has emphasized the importance of the situation. Today Lausanne is the node of the railway system of western Switzerland. In passenger traffic it ranks third among Swiss towns (preceded by Zurich and Basel); in tonnage of freight it ranks fifth. In 1910 the foreign element of the town numbered 15,800 or nearly one-quarter of the entire population: it is a remarkably cosmopolitan agglomeration.

If it is the situation that brings the stranger to Lausanne it is largely the charms of the site with its beauty and its agreeable climate and its traditions that retain him, for Lausanne is not an industrial town. The Roman settlement, itself on the site of an earlier lake dwelling of the Bronze Age, was built on the delta of the Flon river, a site safe enough in the days of the *pax Romana* but not so during the invasions that followed. Then the town like so many others similarly situated (compare Annecy, south of Geneva, R. Blanchard, Annecy, *Recueil des Trav. de l'Inst. de Géogr. Alpine*, Vol. 4, 1916) was transferred to a place more favorable for defense. Lausanne found such in the *colline de la Cité*, a natural bastion defended on either side by ravines. Opposite on a morainic crest grew up the commercial town. The two became fused and the combined city spread up and down the accidented surface. Herein, in the absence of level space, lies the difficulty of creating an industrial center. To meet the commercial needs of the growing population an artificial flat of 17 acres has been built in the ravine of the Flon. Now the city is turning further aside to a fluvo-glacial plain to the west. The newest growth is on a site morphologically similar to that of the earliest. (Charles Biermann, Situation et site de Lausanne, *Études de Géographie Urbaine*, *Bull. Soc. Neuchateloise de Géogr.*, Vol. 25, 1916, pp. 122-149. For a geographical description of the hinterland of Lausanne see the article by the same author, Le Jorat, *Bull. Soc. Neuchateloise de Geogr.*, Vol. 20, 1909-1910.)

POLAR REGIONS

ARCTIC

Exploration in Northern Greenland. By the fine work of the First Thule Expedition in solving the Peary Channel problem the leader, Knud Rasmussen, established a reputation that has aroused keen interest in his second expedition (see "The Non-Existence of Peary Channel," *Geogr. Review*, Vol. 1, 1916, pp. 448-452; also the note in the *Review*, Vol. 2, 1916, pp. 65-66, on Rasmussen's "Report of the First Thule Expedition, 1912," *Meddelelser om Grønland*, Vol. 51, 1915). Rasmussen's safe return to his base in North Star Bay, "the northernmost trading station in the world," has been announced by the American Museum Journal for May. Accompanying the

announcement is Rasmussen's own statement of his original plans for the expedition, which it will be remembered was delayed from 1916 to 1917. Letters from Greenland, with further details illuminating in particular the difficulties under which the expedition labored, have been lately received by W. Elmer Ekblaw, geologist of the Crocker Land Expedition, who furnishes the following note for the *Review*.

Hardships Experienced by Rasmussen's Second Thule Expedition. The expedition, composed of Knud Rasmussen, leader; Dr. Thorild Wulff, Swedish botanist and ethnologist; and Lauge Koch, geologist and cartographer, left its base in North Star Bay in April, 1917, and proceeded successfully as far as St. George's Bay (82° N.). Here game failed them, so that, with the exception of a few hares, and a seal or two, they killed no food at all. Unable to proceed beyond De Long's Fiord, about a degree farther north, they turned homeward at that place. One of the Eskimos, Hendrik Olsen, who distinguished himself in the service of Mylius Erichsen's East Greenland Expedition several years ago, was killed and eaten by wolves while out hunting game, just before the party mounted the ice cap to start back to North Star Bay.

The journey across the ice cap was accomplished in the face of almost incredible difficulties. The party ate the dogs one after another; just after the last dog had been eaten they reached Cape Agassiz, near Humboldt Glacier, on the west coast. They were all weak, exhausted, and starving. Knud Rasmussen and one Eskimo started immediately for Etah to obtain succor for the others, who were to follow along more slowly, living on the game that they hoped to kill, until help reached them.

Unfortunately they could find neither hare nor caribou, and in a few days Dr. Wulff became so weak that he could go no farther. After writing brief messages to his family and dictating to Koch a summary of his observations of the flora of the lands immediately south of the Humboldt Glacier, he bade his companions farewell and resigned himself to his fate. Koch, whose strength was fast waning and who was too weak to encourage Wulff to proceed or to help him in any way, continued slowly with the two Eskimos on the weary way toward Etah.

Dr. Wulff had continued his scientific labors to the last. According to the letters, he accomplished a splendid piece of work, both in botany and zoölogy. He had continued his observations until he could go no farther and died, as a brave man would, in the field of his endeavors.

Koch also accomplished satisfactory work. He mapped the entire coast along which he traveled, including several new fiords that he discovered, and collected Silurian and Cambrian fossils far north. According to a letter from Upernivik, dated January 23, 1918, he had not then fully recovered from the effects of his exhaustion and starvation.

W. ELMER EKBLAW

Echoes of the War in Greenland. The world war is making itself felt even in the Smith Sound region. No supplies have reached the station at North Star Bay, and nearly all the ammunition is exhausted. The Eskimos will soon be forced to resort to the primitive methods of hunting and living that they employed before the white man came with his guns, ammunition, cooking utensils, knives, matches, tea, and cloth. In Danish Greenland, where the natives have become quite dependent on the simple provisions and equipment sold them by the Royal Trading Company, the effect is even more pronounced and prospects even darker, for there the people have quite forgotten the methods of hunting employed by their ancestors and have to rely in large measure upon imported supplies.

Last year the hunt was generally poor in the northern districts, with small kills of seal and white whale, the chief resources of the Greenlanders. The summer of 1917 was an unusually severe and unfavorable season, with much snow, cloudy weather, and cold. The winter began early. As far south as Umanak sledging was possible in mid-November, so that the Eskimos could go out to set their seal nets. Heavy ice came soon afterward and did not break up again. The governor and the doctor at Upernivik, while out on a motor-boat journey, were frozen in far from the village and did not escape to return to their homes until after a month's absence.

W. ELMER EKBLAW

ANTARCTIC

The New Importance of the Whale Fisheries of South Georgia. Among the trophies secured to Britain by the voyages of that great Empire builder, Captain Cook, is South Georgia, now a dependency of the Falklands, 880 miles away to the west-northwest. Until a few years ago the desolate isle, set in the stormy sub-Antarctic seas, remained uninhabited save temporarily by the sealers who frequented these waters



FIG. 1.



FIG. 2.

FIG. 1—Whale factory, Leith Harbour, South Georgia. (Photo reproduced, by permission, from article by Theodore E. Salvesen, cited on p. 288.)

FIG. 2—Whaling station at King Edward Cove, South Georgia. (Photo reproduced, by permission, from article by J. Quayle Dickson, cited on p. 288.)

as remarkable for their wealth of animal life as for their gales. From Captain Cook's voyage to the recent extermination of the fur seal, sealers have reaped a rich harvest around South Georgia. Today a new harvest is being gathered from these seas, for the island with its sister dependencies is very favorably circumstanced for shore whaling.

In the old days of deep-sea whaling the species hunted were practically limited to the sperm whale, source of spermaceti oil, the bowhead, and the right whale. Before the invention of the steam whaler and the harpoon gun in the sixties of the last century difficulties in the way of capture and reduction rendered impracticable the hunt of other species, although several were capable of yielding "whale" oil. Introduction of shore whaling permitted the whaler to follow these "finner" species among which are the humpback and finner whales so abundant in sub-Antarctic waters (R. C. Andrews: *Whale Hunting with Gun and Camera*, New York, 1916).

In 1902 the Swedish Antarctic Expedition wintered on South Georgia. The master of the ship *Antarctic*, Captain C. A. Larsen, saw the opportunity for introducing shore whaling. Two years later, with the aid of Argentine capital, he established a whaling company with headquarters on King Edward Cove and an equipment of a factory and two steam whalers. Just before the war the companies operating from South Georgia had been increased to seven (four Norwegian, two British, one Argentine); they had five shore factories and four floating factories. Fourteen other companies operated in the Falklands and its other dependencies, and many floating factories came annually from Europe. During the season 1912-13 the number of whales caught by the South Georgia companies alone numbered 5,000; their yield of oil was 200,000 barrels, nearly half the complete quota from the dependencies and the Falklands as a whole (Theodore E. Salvesen: *The Whale Fisheries of the Falkland Islands and Dependencies*, in "Report on the Scientific Results of the Voyage of *S. Y. Scotia* During the Years 1902, 1903, and 1904," Vol. 4, Zoölogy, pp. 479-486. See also J. Quayle Dickson: *The Empire's Outpost in the South Atlantic*, *United Empire*, Vol. 7, N. S., 1916, pp. 161-172). In 1916, of the 634,500 barrels representing the world's production of whale oil, 329,000 barrels came from South Georgia and 216,000 from the South Shetlands.

When whaling began in the southern seas the great majority of the catch belonged to the humpback species. In the catch of 1912-13 this species formed a little over half the total. Actually its numbers appear to vary considerably, for the humpback is a great migrant. Among the species yielding "whale" or "train" oil the humpback is notable because of the high glycerin content of its oil. Here we touch on one of the ramifications of the economic perturbations created by the war. Glycerin is used in the manufacture of explosives; a new value is put upon whale oil; Great Britain by means of its territorial possessions acquires a practical monopoly of the world's output of this product (R. C. Murphy: *Island Resources in War and Peace*, *Sea Power*, Vol. 4, 1918, No. 6, pp. 383-385; Alfred Bigland: *Whales in War*, *Land and Water*, No. 2930, Vol. 71, 1918, July 4, pp. 18, 20).

GEOGRAPHICAL NEWS

A New Italian Atlas. The Touring Club of Italy announces a plan for the publication of a large international atlas. It proposes to put the work upon a broad scientific basis and to make Italian scholars independent of German atlases. No large atlas comparable with Stieler or Andree has ever been published in Italy, and political and commercial considerations have been combined in the framing of a broad and scholarly program of map compilation. While the atlas is to be primarily Italian in general character, it will at the same time emphasize international features. Particular attention will be given to the means of communication in different countries and to Italian colonies.

As a first undertaking the Club is forming a library of selected books and articles of a geographical nature and also a collection of maps so as to have at its immediate disposal source material of the highest character. The maps are to be issued to subscribers in sets, and each set will be complete for one or more countries. The whole enterprise will require from eight to ten years for its completion.

The scientific editor of the atlas is Professor Olinto Marinelli of Florence, who will be remembered by American geographers as one of the Italian delegates of the Trans-Continental Excursion of 1912, conducted by the Society. To the Memorial Volume of the Excursion he contributed an interesting paper entitled "Confronto fra i 'bad lands' italiani e quelli americani."

The technical map work is in charge of Signor P. Corbellini, and the general direction has been assumed by Signor L. V. Bertarelli. The high reputation of the gentlemen associated in this enterprise, no less than the fine maps which the Italian Club have published in the past, are a guarantee of the highest success.

The American Journal of Physical Anthropology. In these days of ever more and more numerous scientific journals, it is an unusual experience to greet an addition to the list which seems to be really necessary. But this is the case with the *American Journal of Physical Anthropology*, the first number of which (for January-March, 1918) has just made its appearance.

The name of the founder and editor, Dr. Aleš Hrdlička, is a guarantee that the scientific standing of this new journal will be of the very highest. This quality, added to an obvious desire to give the publication as wide a scope as possible, constitutes its chief attraction. Especially valuable will be the pages devoted to "War Anthropology." They will be the means of helping anthropology to "come down to the ground." For years the older anthropological journals in this country, as well as in England, France, and other countries, have been overburdened with technical discussions whose appeal must perforce be limited. Such papers, however, are essential, and the best of that sort will, from time to time, appear in the new journal; but vastly more important, both as regards immediate value and the generality of their appeal, will be the papers on war anthropology. In giving an irreproachable place of publication to authors who wish to treat of this highly important matter, Dr. Hrdlička has started a movement which may result in putting anthropology back in that place in the public esteem which it held in the days of Darwin and Huxley. It may even result in making some anthropological information an indispensable part of education.

Another excellent feature of the journal is the provision that is to be made for the inclusion of papers in Spanish, as well as in English. This should appeal to our brother scientists in Spanish America, with whom we have many interests in common.

In addition to the points already noted, the journal will be made invaluable by the papers on method, technical questions, anthropometry, and so on. Altogether, it is an admirable publication.

PHILIP AINSWORTH MEANS

PERSONAL

MR. T. A. BLAIR of the United States Weather Bureau, Salt Lake City, read a paper on "The North Pacific in Relation to the Weather of Adjacent Lands" at the semicentenary of the University of California, March 18-23.

MR. G. M. BUTLER, since his recent appointment as Director of the Arizona State Bureau of Mines, has undertaken as one of the duties of his new office a collection of data for the preparation of a reconnaissance geological map of Arizona.

MR. D. L. HAZARD, of the U. S. Coast and Geodetic Survey, read a paper on March 30 before the Philosophical Society of Washington on "The Magnetic Survey of the United States." Since 1899, when the work in its present systematic and intensive form was begun, about 5,500 stations have been established, practically completing the proposed number of observation points, and attention is now being directed more especially to the investigations of areas of local disturbance.

SEÑOR SALVADOR MASSIP, professor of geography in the Matanzas Institute, Cuba, and Director of the Cuban Geographical Society, is spending the summer in the United States. He is at present engaged in study at Columbia University. A recent publication by Señor Massip is reviewed in the bibliographical section of the current *Review*.

MR. R. C. MOSSMAN was recently awarded the Keith Prize of the Royal Society of Edinburgh for his work on the meteorology of the Antarctic regions, which originated with the important series of observations made by him during the voyage of the *Scotia* in 1902-4 and has continued to the present time.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

CANADA

General

MARTIN, CHESTER. **Lord Selkirk's work in Canada.** 240 pp.; maps, bibliogr., index. (Oxford Historical and Literary Studies, Vol. 7. Issued under the direction of C. H. Firth and Walter Raleigh.) Clarendon Press, Oxford, 1916. 8s. 6d. 9 x 6.

Selkirk's life was occupied largely with settling Scottish emigrants in Canada. From 1802 to 1811 efforts were centered upon turning the tide of Scottish emigration from the Carolinas to Canada. Settlements were established in Prince Edward Island and at Baldoon in Upper Canada. The latter colony lasted only a few years; the former's land passed in 1860 from the Selkirk family to the government by sale. In 1807 the idea of colonizing the West began to take shape; and for a decade after 1811 efforts were made to plant a colony at Red River, in what was then the Far West. To this end Lord Selkirk secured from the Hudson's Bay Company a grant of an area of 116,000 square miles "now comprising, in parts of Manitoba, North Dakota, and Minnesota, one of the most fertile districts on the North American continent." Selkirk's name is therefore identified with the West. For half a century the Red River Settlement was an obscure though thrifty frontier colony in the heart of the wilderness. It was destined, however, as the author puts it, to be "the anchor of British rule in the West, the one vested interest which kept intact the territory north of the forty-ninth degree of latitude until the preservation of the West for the British Empire appeared among the avowed policies of the Canadian Confederation."

AVARD L. BISHOP

— **Canada, Water powers of.** **The Province of Ontario**, by H. G. Acres. 41 pp.; map, ills. **Province of British Columbia**, by G. R. G. Conway. 167 pp.; map, diagrs., ills. **The Province of Quebec**, by F. T. Kaelin. 35 pp.; maps, ills. **The Prairie Provinces: Manitoba, Saskatchewan, Alberta**, by P. H. Mitchell. 78 pp.; maps, diagrs., ills. **The Maritime Provinces: Prince Edward Island, New Brunswick, Nova Scotia**, by K. H. Smith. 34 pp.; map, ills. Dominion Water Power Branch, Dept. of the Interior, Ottawa, 1915.

DAWSON, W. B. **Tide levels and datum planes in eastern Canada, from determinations by the Tidal and Current Survey up to the year 1917.** 95 pp. Dept. of the Naval Service, Ottawa, 1917.

LAUT, A. C. **The Canadian Commonwealth.** (Problems of the Nations, P. L. Haworth, edit.) 343 pp.; index. Bobbs-Merrill Co., Indianapolis, 1915. \$1.50. 8 x 5.

LAWLER, JAMES. **Historical review of Canada's timber industry.** *Monthly Bull. of Agric. Intelligence and Plant Diseases*, Vol. 7, 1916, No. 9, pp. 1227-1234. Internatl. Inst. of Agric., Rome.

LEWIN, EVANS. **Canada and the West Indies.** *United Empire*, Vol. 7, N. S., 1916, No. 11, pp. 704-706. [Discusses the desirability of an ultimate commercial and political union between Canada and the British West Indies. Questions in regard to the development of the West Indies and other Crown Colonies and colonies not possessing responsible government are reported under the title "Crown Colony Development" in the succeeding issue of *United Empire* (Vol. 7, N. S., 1916, No. 12, p. 797).]

LEWIS, F. J. **Vegetation distribution in the Rocky Mountains Park.** ills. *Canadian Alpine Journ.*, Vol. 8, 1917, pp. 87-95.

MORTON, B. R., AND R. G. LEWIS. **Native trees of Canada.** 233 pp.; maps, diagrs., ills., indexes. *Forestry Branch Bull.* No. 61. Dept. of the Interior, Ottawa, 1917. [Approximate distributions are shown.]

RABOT, CHARLES. *Les futures routes d'exportation des céréales du Canada*. Map, ills. *La Nature*, No. 2310, 1918, Jan. 5, pp. 1-6.

SHORTT, ADAM. *The economic effect of war upon Canada*. *Trans. Royal Soc. of Canada*, Vol. 10, 1916, Ser. 3, pp. 65-74.

TRÉMAUDAN, A. H. DE. *The Hudson Bay Road (1498-1915)*. xvi and 264 pp.; maps, ills., bibliogr., index. J. M. Dent & Sons, Ltd., London and Toronto, 1915. 7s. 6d. 8 x 5½.

WRONG, G. M., H. H. LANGTON, AND W. S. WALLACE, eds. *Review of historical publications relating to Canada: Publications of the year 1915*. xii and 224 pp.; index. (*Univ. of Toronto Studies*, Vol. 20.) Toronto, 1916. [This interesting and valuable publication ought repeatedly to be brought to the attention of geographical scholars because of its wide range of interest and in general its authoritative reviews, arranged in classified form with a section entitled: Geography, Economics, and Statistics. Both the spirit and style of the reviews are admirable, but occasionally a broader outlook would have assisted the reviewer materially, as for instance on page 11 in the review of Professor Fernald's work and that of W. A. Munn on Vinland. Geographers generally will not agree that "the climate and geographical conditions must have changed so greatly in a thousand years along the Labrador coast that any attempt to identify the places mentioned in the sagas must be today a very hazardous proceeding." Hazardous, no doubt, but not because of *established climatic and geographical changes* in the past thousand years.]

UNITED STATES

General

BOWIE, E. H., AND R. H. WEIGHTMAN. *Types of anticyclones of the United States and their average movements*. 25 pp.; maps, diags. *Monthly Weather Rev. Suppl. No. 4*. Washington, D. C., 1917.

In 1914 Messrs. Bowie and Weightman published a monograph entitled "Types of Storms of the United States and Their Average Movements" (*Monthly Weather Rev. Suppl. No. 1*). The present study, of anticyclones, is an extension and completion of the previous paper. The general method followed is the same in the two cases. There is a brief statement of the published views concerning the origin of cyclones and anticyclones, but beyond that this discussion is largely statistical. It, however, contains also brief descriptions of the types of anticyclones, their courses, and the accompanying weather and temperature conditions.

The two regions in which nearly all our anticyclones appear before they enter the United States are (1) off the Pacific coast and (2) Canada west of the 100th meridian, notably Alberta. A few appear first in southern Canada east of the 100th meridian, and some, of another type, seem to form over the Rocky Mountains and the western plateau. Anticyclones pass from the Pacific Ocean to the United States during all months, but the number is at a maximum in spring and fall. The anticyclones from southern Canada west of the 100th meridian are at a maximum in winter. The preponderance of the highs from Alberta over the highs from the Pacific is at a maximum during the winter season.

Our authors classify anticyclones as follows: North Pacific, South Pacific, Alberta, Rocky Mountains and Plateau Region, and Hudson Bay. The respective regions of origin are shown on Chart 1. The prevalence of any one of these types at any time of the year is due to conditions in the general circulation of the winds. Changes in pressure over the Alaskan area, including the Aleutian Islands, are evidently critical controls over the anticyclonic types as well as over cyclonic types and movements. Our authors have based their statistics as to the numbers and movements of anticyclones on the period 1892-1912. The results are presented very fully, in tables, diagrams, and charts. Each type of anticyclone is discussed and described separately and is illustrated by means of charts. Curiously enough, but little detailed work has been done on the tracks of our anticyclones, while our cyclones have received a large share of attention: Messrs. Bowie and Weightman have worked out the approximate average 24-hour movement, for months and in miles, for 5-degree squares, of each type of anticyclone during the period 1892-1912 and have charted their results. This is an important addition to our previous knowledge on this subject.

While many of the details of this discussion will be chiefly useful to official forecasters, there is much information which should find its way, at once, into our courses of instruction in meteorology and, as soon as possible, into our textbooks.

R. DEC. WARD

MCCULLOH, WALTER. **Conservation of water: Addresses delivered in the Chester S. Lyman lecture series, 1912, before the senior class of the Sheffield Scientific School, Yale University.** x and 100 pp.; diags., ills. Yale University Press, New Haven, 1913.

The geography of the United States especially in its relation to water supply is concisely covered in the introductory chapter of this series of addresses, especial reference being given to the rainfall, evaporation, and public uses of the water with their bearing upon conservation. From this as a foundation Mr. McCulloh has proceeded to develop certain basic data of hydroeconomics, bringing in a discussion of rainfall and run-off as related to topography and geology.

These data lead up to a consideration of water power and of market demands, together with the possibility of supplying needed power by the use of storage reservoirs. There are also taken into consideration certain related questions of water supply for municipal uses, sanitation, and irrigation.

The series concludes with details relating to the water resources of the state of New York and the necessity of utilizing these to a more considerable extent than in the past. Descriptions are given of present developments on the Niagara, Genesee, Hudson, and other streams of the state. The lectures as a whole give an interesting review of conditions and facilitate the study of this important subject. F. H. NEWELL

CLARK, V. S. **History of manufactures in the United States, 1607-1860.** With an introductory note by H. W. Farnam. xii and 675 pp.; maps, diags., bibliogr., index. Carnegie Institution, Washington, D. C., 1916. \$6.00. 10 x 7. [An exhaustive, systematic, and authoritative treatise.]

DARTON, N. H. **The structure of parts of the central Great Plains.** iv and 26 pp.; map, diags., ills. *U. S. Geol. Survey Bull.* 691-A. Washington, D. C., 1918.

ERSKINE, J. Y. **Coal in the United States: Production and trade.** Map, diags. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 11, pp. 481-495.

GABRICI, L. D. **Gli Italiani nell'agricoltura degli Stati Uniti.** Map. *Riv. Coloniale*, Vol. 12, 1917, No. 10, pp. 469-479; No. 11, pp. 524-536.

HARTS, W. W. **Natural waterways in the United States.** Diagr., ills., bibliogr. *Ann. Rept. Smithsonian Inst. for 1916*, pp. 545-578. Washington, D. C., 1917.

KEMP, J. F. **The outlook for iron.** Bibliogr. *Ann. Rept. Smithsonian Inst. for 1916*, pp. 289-309. Washington, D. C., 1917.

KULLMER, C. J. **Monthly storm frequency in the United States.** Maps. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 338-393 (discussion, pp. 392-393). Washington, D. C., 1917.

MANSFIELD, G. R. **The phosphate resources of the United States.** Maps, diagr., ills., bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 8, Section 7: Mining, Metallurgy, Economic Geology, and Applied Chemistry, pp. 729-766. Washington, D. C., 1917.

MILLER, E. R. **The meteorological influences of lakes.** Maps, diags., bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 189-198. Washington, D. C., 1917. ["The relatively important effects of the land and sea breezes and of the monsoons of the Great Lakes of North America."]

MOONEY, JAMES. **The passing of the Indian.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 1, Section 1: Anthropology, pp. 174-179. Washington, D. C., 1917. [United States.]

MOREAU DE SAINT-MÉRY, M. L. E. **Voyage aux États-Unis de l'Amérique, 1793-1798.** Edited with an introduction and notes by S. L. Mims. (Yale Historical Publs.: Manuscripts and Edited Texts, II.) xxxvi and 440 pp.; ills., index. Yale University Press, New Haven, 1913. \$2.50. 9½ x 6.

NEWELL, F. H. **Irrigation and drainage.** ills. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 3, Section 3: Conservation of Natural Resources, pp. 260-283. Washington, D. C., 1917. [Relates to the United States only.]

PARKINS, A. E. **A comparison of transportation on the Mississippi Basin rivers and the Great Lakes.** *Journ. of Geogr.*, Vol. 16, 1917-18, No. 6, pp. 201-210.

POGUE, J. E. **Fertilizers: An interpretation of the situation in the United States (The mineral industries of the United States).** 22 pp.; diagrs. *U. S. Natl. Museum Bull.* 102, Part 2. Smithsonian Inst., Washington, D. C., 1917.

QUAIFE, M. M., edit. **The journals of Captain Meriwether Lewis and Sergeant John Ordway, kept on the expedition of western exploration, 1803-1806.** 444 pp.; maps, ills., index. *Publ. State Hist. Soc. of Wisconsin, Collections, Vol. 22.* Madison, 1916. [See footnote 2 to the article "A New Lewis and Clark Map" by Annie H. Abel, *Geogr. Rev.*, Vol. 1, 1916, p. 329.]

SMITH, J. W. **Agricultural meteorology.** Diagrs., bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 75-92 (discussion, pp. 90-92). Washington, D. C., 1917. [United States. For an abstract of another paper of the same title by the same author see the October, 1917, *Review*, Vol. 4, p. 317.]

SMITH, P. S. **United States Geological Survey, Topographic instructions of the.** 228 pp.; diagrs., ills., index. U. S. Geol. Survey, Washington, D. C., 1915. [Replacing the Manual of Topographic Methods, *U. S. Geol. Survey Bull.* 307.]

VAN HISE, C. R. **Some economic aspects of the world war.** *Science*, No. 1201, Vol. 47, 1918, Jan. 4, pp. 1-10; No. 1202, Jan. 11, pp. 27-37.

WARD, R. DEC. **The thunderstorms of the United States as climatic phenomena.** Maps, diagrs., bibliogr. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 393-411 (discussion, pp. 410-411). Washington, D. C., 1917.

WARD, R. DEC. **The tornadoes of the United States as climatic phenomena.** Maps, diagrs., ills., bibliogr. *Quart. Journ. Royal Meteorol. Soc.*, No. 183, Vol. 43, 1917, pp. 317-329. [Abstracted in the July *Review*, Vol. 6, 1918, p. 71.]

North-Central States.

SHERZER, W. H. **Detroit folio: Wayne, Detroit, Grosse Pointe, Romulus, and Wyandotte quadrangles, Michigan.** 22 pp.; maps, diagrs., ills. *Geologic Atlas of the United States, Folio No. 205.* U. S. Geol. Survey, Washington, D. C., 1917.

The publication by the U. S. Geological Survey of a folio of text and maps covering the area about any large city is a substantial contribution, no less to education than to science and economic development. The Detroit Folio is one of the best illustrations of this form of achievement. The schools of Detroit and of the district round about should make the fullest use of the material now available in well-organized form. The variety of subjects treated makes this folio unusually valuable, and many laymen ought to be interested in it. There is a discussion of the rock strata and their history, of the lake systems that developed in large part in front of the ice of the Pleistocene Epoch, of the soils, forests, and other resources, and of the human occupation of the land. Necessarily the greatest emphasis has been placed upon the surface deposits and their relation to the former lake system. The maps present a clear picture of the origin and growth of the lakes that were the precursors of the Great Lakes of today. No citizen of the Detroit region should fail to be interested in the relation of surface features about his home to the larger aspects of the topography formed in an age long past, remolded by the ice, and still further modified by the vast lakes that once stretched far out from the present depressions. The Detroit Folio answers questions about all these topics. The newspapers of that city would perform a real public service by calling the attention of the public to the geologic and economic material now so readily available. If this folio should have the circulation it deserves there would be required not one but several editions. In that event, and before reprinting, it would be well to revise portions of the first column on p. 4, and of the section entitled "Culture" on p. 5. The size and importance of Detroit may be affected to a marked degree by the commerce between the upper and lower lakes, but that requires demonstration! It is a commerce that chiefly passes by. Even without it Detroit would be a great city. The geography of a modern city is a highly complex subject.

UDDEN, ANTON D. **Cyclonic distribution of weather elements for Davenport, Iowa.** Reprinted from *Trans. Illinois Acad. Sci.*, Vol. 7, 1917? 12 pp.

Professor Udden some years ago published a paper "On the Cyclonic Distribution of Rainfall." The present study is in a sense a continuation of that, and is based on the same method. The subject is one of much importance. The more clearly the weather element is brought out, the more vital and the more interesting is the study of

climate. Climate should, as a matter of fact, be studied through weather types and weather controls. It is significant that in the United States, where cyclonic controls are so marked, more emphasis is being laid upon the cyclonic element in climate than elsewhere.

In his study of the cyclonic distribution of the weather elements at Davenport, Iowa, the author has used the morning and evening weather maps for about twenty years. A hypothetical cyclonic area is divided into 25 parts by means of concentric circles and radii. The pressure, wind (direction and velocity), temperature, vapor pressure, relative humidity, cloudiness, and frequency of precipitation are summarized for each section, and the results are then charted. The method is thus the "composite portrait" scheme, long advocated by Professor W. M. Davis, and used by him in his teaching at Harvard fully forty years ago. While Professor Udden's present results are of local rather than general interest, they serve to emphasize the importance of this method of investigation and should serve as a stimulus to students of meteorology elsewhere, who are ready to take up a problem which is in no sense involved and whose solution, for all parts of the country, would undoubtedly improve our weather forecasts.

R. DEC. WARD

BAILEY, E. S. *The sand dunes of Indiana: The story of an American wonderland told by camera and pen.* 165 pp.; ills. A. C. McClurg & Co., Chicago, 1917. 9 x 6. [A pleasant little book that should draw many visitors to the picturesque region it describes. The author makes excellent use of some of the more accessible literature on his subject.]

BRAUN, E. L. *The vegetation of conglomerate rocks of the Cincinnati region.* Diags., ills. *Plant World*, Vol. 20, 1917, No. 12, pp. 380-392.

CARMAN, J. E. *The Pleistocene geology of northwestern Iowa.* Maps, diags., ills. *Ann. Rept. Iowa Geol. Survey*, Vol. 26, 1915, pp. 235-445. Des Moines.

CONDRA, G. E. *Preliminary report on the potash industry of Nebraska.* 39 pp.; maps, diags., ills. *Nebraska Conservation and Soil Survey Bull.* 8, Univ. of Nebraska, Lincoln, 1918. ["The Exploitation of Potash in Nebraska" formed the subject of a note in the *Review*, Vol. 3, 1917, pp. 67-68.]

— *Detroit as a manufacturing city.* Ills. *Bull. Pan Amer. Union*, Vol. 45, 1917, No. 3, pp. 363-374. [Compare remarks on paper read before Association of American Geographers, *Geogr. Rev.*, Vol. 3, 1917, p. 143.]

DEVEREAUX, W. C. *Forecasts of river stages and floods in the Ohio Valley; their importance to commerce and in conserving life and property.* *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 825-830. Washington, D. C., 1917.

GREGG, W. R., AND OTHERS. *Free-air data at Drexel Aerological Station, July, August, September, October, November, December, 1916.* 111 pp.; diags. *Monthly Weather Rev. Suppl. No. 8 (Aerology No. 4)*. Washington, D. C., 1918.

HOLCOMBE, R. I., AND W. H. BINGHAM, eds. *Compendium of history and biography of Polk County, Minnesota.* 487 pp.; ills., indexes. W. H. Bingham & Co., Minneapolis, 1916. 12 x 9. [Of this Red River Valley county there is a chapter on the geography and geology by Warren Upham, and various chapters dealing with early American explorations, the fur trade, and the history of settlement.]

HOPKINS, C. G., J. G. MOSIER, AND F. C. BAUER. *Summary of Illinois soil investigations.* Maps, diags., ills. *Univ. of Illinois Agric. Exper. Sta. Bull. No. 193*, pp. 451-484. Urbana, 1916.

HUBBARD, G. D. *Geography in the Columbus, Ohio, quadrangle.* Map, ills. *Oberlin College Laboratory Bull. No. 19*, Oberlin, 1917. [Reprinted from *Ohio Journ. of Sci.*, Vol. 17, 1917, No. 5, pp. 137-169.]

LEVERETT, FRANK, AND F. W. SARDESON. *Surface formations and agricultural conditions of northeastern Minnesota.* With a chapter on climatic conditions of Minnesota by U. G. Purssell. vi and 72 pp.; maps, diags., ills., index. *Minnesota Geol. Survey Bull. No. 13*. Univ. of Minnesota, Minneapolis, 1917.

MARTIN, LAWRENCE. *The gorge of the upper Mississippi as a rival of the Rhine gorge.* Maps, ills. *Bull. Geogr. Soc. of Philadelphia*, Vol. 14, 1916, No. 4, pp. 127-147.

MOSIER, J. G. *Climate of Illinois.* 125 pp.; maps, diags. *Univ. of Illinois Agric. Exper. Sta. Bull. No. 208*, Urbana, 1918. [For convenience of discussion the State is divided latitudinally into five districts.]

ROBINSON, DOANE, AND C. S. STEVENSON. **Third census of the state of South Dakota: taken in the year 1915.** 1,168 pp. Mark D. Scott, Sioux Falls, [1916]. 9 x 6.

SHETRONE, H. C. **The Indian in Ohio.** Maps, ills., bibliogr. *Ohio Archaeol. and Hist. Quart.*, Vol. 27, 1918, No. 3, pp. 274-510.

WILSON, G. L. **Agriculture of the Hidatsa Indians: An Indian interpretation.** viii and 129 pp.; maps, diagrs., ills. *Univ. of Minnesota Studies in the Social Sciences*, No. 9. Minneapolis, 1917. [While a majority of the agricultural Indian tribes of the United States either abandoned their fields before the white settler or adopted his tools and to some extent his methods, the Hidatsas, shut in their stockaded villages on the Missouri, continued their ancient culture with little change until 1885; hence "It seemed probable that a carefully prepared account of Hidatsa agriculture might very nearly describe the agriculture practiced by our northern tribes in pre-Columbian days. It was hoped that this thesis might be such an account."]

ASIA

CHINA

ANDREWS, R. C. **Traveling toward Tibet; The frontier of the forbidden land; Camps in China's tropics.** Ills. *Harper's Mag.*, No. 815, Vol. 136, 1918, pp. 617-632; No. 816, pp. 894-905; No. 817, Vol. 137, 1918, pp. 124-137. [Dealing with the same trip described in the author's articles in the July and August numbers of the *Review*.]

REED, A. C. **Coal mining in China.** Maps, diagrs., ills. *Scientific Monthly*, Vol. 5, 1917, No. 1, pp. 36-49. [A description of the methods employed in the Ping Hsiang (Kiangsi) colliery, the largest coal mine in China: the extremely primitive methods with which these mines have been worked from "unknown ages" and the thoroughly up-to-date methods put into operation by expert German engineers. The author also shows the importance these mines will have when reached by the railroads now projected or under construction from the coast. This coal field is of special value since near it lie valuable deposits of iron, lead, copper, and silver.]

ROBERTSON, J. A. T. **An engineer's travels in western China.** Map, ills. *Far Eastern Rev.*, Vol. 13, 1917, No. 8, pp. 290-294. [Szechuan.]

SCHRAMMEIER, W. **Kiautschou: Seine Entwicklung und Bedeutung. Ein Rückblick.** 96 pp.; map, ills. (Schriften des Deutsch-Chinesischen Verbandes E. V.) Karl Curtius, Berlin, 1915. Mk. 1.50. 9 x 6.

VAN BIEMA, EDUARD. **Bladzijden uit mijn dagboek op een reis in China.** *Vragen van den Dag*, Vol. 31, 1916, No. 12, pp. 937-946.

WILTON, E. C. **Yun-nan and the West River of China.** Maps. *Geogr. Journ.*, Vol. 49, 1917, No. 6, pp. 418-440 (discussion, pp. 436-440).

POLAR REGIONS

ARCTIC

NABER, S. P. L'HONORÉ, edit. **Reizen van Willem Barents, Jacob van Heemskerck, Jan Cornelisz. Rijp en Anderen naar het Noorden (1594-1597) verhaald door Gerrit de Veer.** Maps, diagrs., ills., index. Vol. 1, pp. xxvii and 1-178; Vol. 2, pp. cxxxviii and 183-341. (*Publ. Linschoten-Vereeniging*, Nos. 14 and 15.) Martinus Nijhoff, The Hague, 1917. 10 x 7.

The Linschoten Society of the Netherlands has for its object the publication of rare or hitherto unpublished narratives of travel by Dutch mariners and explorers. The fifteen volumes published since its inception in 1909 are indicative of high aims, so that it is no idle prophecy to state that, in due time, the works of this Society will occupy as important a position in geographical libraries as do the Hakluyt publications.

The latest publication of the Society consists of volumes 14 and 15 containing the narrative of Gerrit de Veer, originally published in 1598 in Amsterdam. De Veer occupied a subordinate position with the second and third expeditions sent out to discover the northeastern route to the East Indies. There appears to be every reason to believe that he was a protégé of the intrepid Dutch pilot, Willem Barents, and that he in consequence had a good opportunity to obtain first-hand information regarding the first expedition of which he was not a member, but of which Barents undoubtedly furnished

him ample details. The descriptions of the first and second expeditions are brief, while that of the third is far richer in details.

In 1594 William Barents, a native of Haarlem, was instructed by the States General of the Netherlands to join a squadron which was to attempt the finding of a northeast passage through the Vaigach (Yugor) Straits. At that time, it was of prime importance to find a route by which the Dutch merchants could dispatch their vessels to the East Indies without fear of molestation by Spanish men-of-war. The particular vessels of the squadron which were commanded by Barents had orders to detach themselves from the main fleet and sail to the northward of Nova Zembla. Barents explored the western coast of this island, while the southern expedition, on reaching the Kara Sea and finding open water, returned and, after joining Barents, set sail for The Netherlands, where the commanders spread the joyful tidings that the shorter passage to the Indies had been discovered.

In 1595 a second expedition was dispatched with the purpose of making further observations and of continuing through the Kara Sea. Jacob van Heemskereck, who in later years won renown as Admiral of the Dutch fleet, and Jan Cornelisz. Rijp as well as the chronicler, Gerrit de Veer, held subordinate positions on this expedition. After passing through the Straits of Vaigach, the Kara Sea was found to be one mass of ice and the squadron had to return.

It was now thought that the problem of finding a northeast passage might be solved by adhering to the plans laid out for Barents on the first expedition, *i. e.* by sailing to the northward of Nova Zembla. In consequence, Barents was again sent out, in 1596, with two vessels, one of which was commanded by Van Heemskereck, while Rijp was master of the other. De Veer again sailed with Barents, who was chief pilot of the expedition. It appears that after departing from the home waters, Barents was unwilling to follow the instructions given him by the Dutch authorities and that it was only through the persistence of Rijp that he finally did so. This influence brought to bear on Barents by Rijp resulted in the discovery of Bear Island on June 8, 1596, and of Spitzbergen on June 17, so that the credit of the discovery of these islands should by rights belong to Rijp. On this third expedition, the vessel on which Barents and Van Heemskereck found themselves was caught in the ice, after reaching the eastern coast of Nova Zembla. It was here that the officers and crew of Heemskereck's ship spent the winter of 1596-97, building the renowned wooden house which was discovered in 1871 by a Norwegian whaler and subsequently investigated by Koolemans Beynen with the *Pandora* in 1876. When the mariners found in the spring of 1597 that their vessel was hopelessly damaged, they built two small wooden sloops which ultimately carried the survivors to the Russian settlements on the mainland from whence they finally succeeded in rejoining Rijp, whose ship had withstood the dangers of the arctic winter. Fate did not suffer Barents to return to his native land; he died in one of the small boats on June 20, 1597.

The notes collected and published by L'Honoré Naber in the second volume are especially complete and show the enthusiastic love of the author for the subject of his investigations. The cartographer interested in early European maps of the arctic regions finds much of value in the posthumous Barents map of 1598, a reproduction of which accompanies the second volume. Spitzbergen and Bear Island (T'veere Eylandt) are shown for the first time on this map.

THEODOOR DE BOOY

RASMUSSEN, KNUD. *Över Grönlands Inlandsis: Dagboksblad från "Den första Thule-expeditionen."* Translated from the Danish by Axel Nihlén. viii and 236 pp.; maps: P. A. Norstedt & Söners förlag, Stockholm, 1915. Kr. 2.50. 8 x 5.

The scientific results of Knud Rasmussen's sledge journey of 1912 across the broad northern expanse of Greenland's inland ice have been described in his "Report of the First Thule Expedition," which has been reviewed in an earlier number of the *Review* (Vol. 2, 1916, pp. 65-66).

The present volume contains a Swedish translation of the Danish original of Knud Rasmussen's daily journal on this trip, which was made, in the main, by means of what the author calls "Eskimo technique." Knud Rasmussen is a Greenlander of mixed blood. He has all the best qualities of the Eskimo, his patience, endurance, and good humor, his intimate knowledge of nature and capacity for frugal living. At the same time, he possesses the fire and vision of the Scandinavian combined with unusual literary ability. The book is well worth translating into English in its entirety.

HANNA ASTRUP LARSEN

LUNDAGER, ANDR. *Some notes concerning the vegetation of Germania Land, north-east Greenland.* Map, diagrs., ills. *Meddelelser om Grønland*, Vol. 43, 1917, pp. 349-414. Copenhagen.

THE GEOGRAPHICAL REVIEW

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THE GEOGRAPHICAL BARRIERS TO THE DISTRIBUTION OF BIG GAME ANIMALS IN AFRICA

By EDMUND HELLER

Only those persons who have traveled through the highland grassy veld of East or South Africa realize how extremely abundant big game animals are in these regions. The favorite feeding grounds on the plains are as well stocked with big game as are our ranches of the West with cattle. On the plains of British East Africa I have often seen five hundred or more head of big game in a day's trek over such favored spots as the Loita, Athi, and Uasin Gishu Plains. From some of the small kopjes rising above the Loita Plains I have looked down and counted at one time some three hundred head of hoofed game feeding in small herds and groups made up of such species as kongoni hartebeests, Thomson and Grant gazelles, wildebeests, zebras, Masai giraffes, elands, topis, waterbucks, impallas, and wart hogs. Associated with these herds but hidden by the grass were such cover-haunting species as steinboks and plains duikers, which are of small size. Fully a third of this assemblage of game was made up of zebras, which occurred in herds of fifteen to twenty animals. The wildebeests were few in number and in herds, but the hartebeests and gazelles were very numerous and scattered about in groups of mixed species as far as the eye could see. Large assemblages of game of this sort could be seen daily on the same plain, for it is quite normal and not due to the temporary crowding of a favorite feeding ground. In the immediate vicinity of such herds but hidden during the day in cover lurk such carnivorous animals as hyenas, jackals, cheetahs, lions, and an occasional leopard.

RANGES OF BIG GAME ANIMALS

This circumstance, so fortunate for the naturalist, must be accredited to a benign policy of conservation. Before the European had been in the

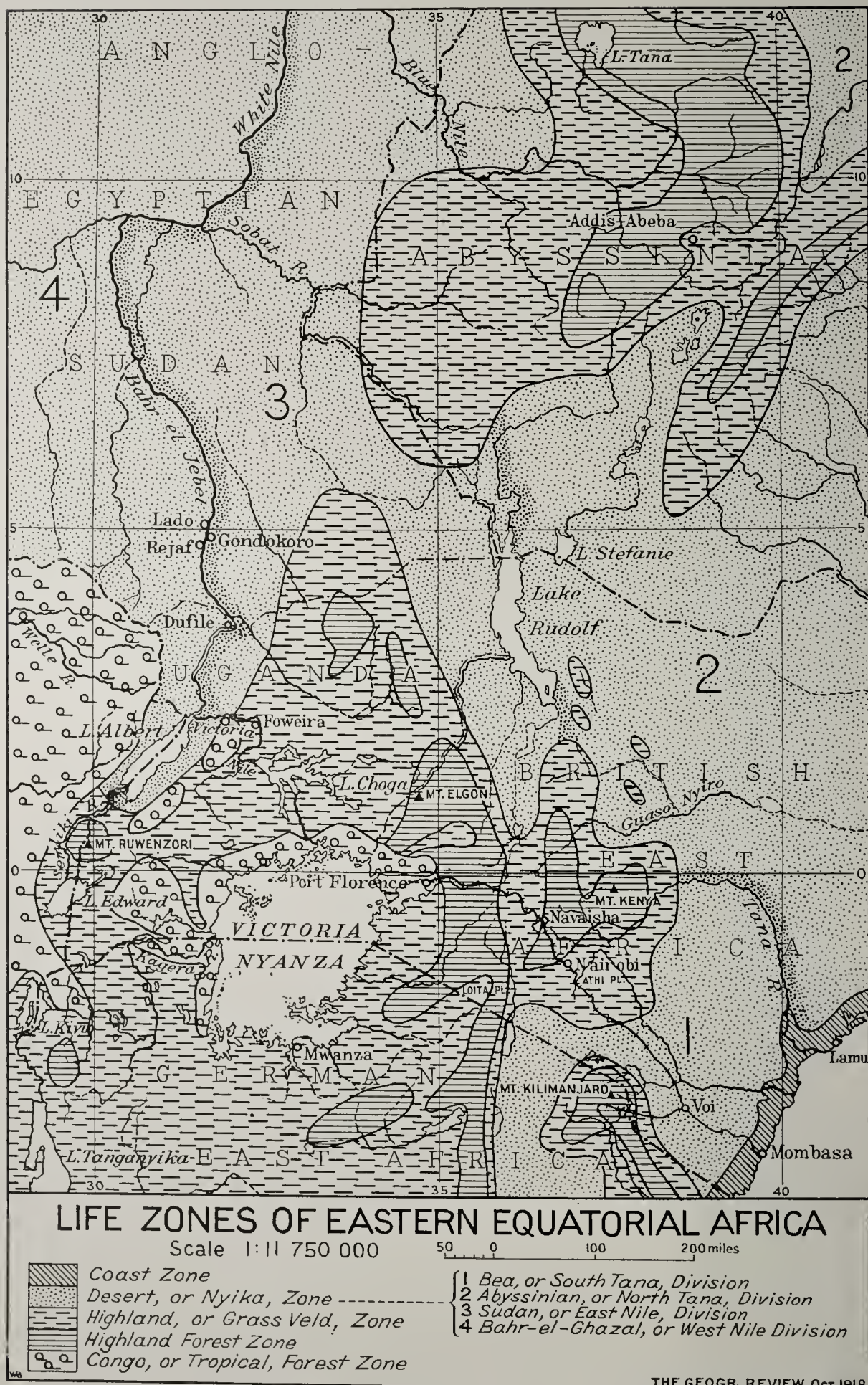


FIG. 1—Map showing the life zones of eastern Equatorial Africa and the subdivisions of the desert, or nyika, zone. Scale, 1:11,750,000.

territory long enough to effect any serious diminution of the game the government created vast reserves and a system of rigorous game laws.¹

The native tribes are chiefly agricultural and seldom if ever eat the meat of game animals or slaughter them. Fire arms have carefully been kept from them by the European governments under whose protection they now dwell. Hence today, with the possible exception in certain districts of the elephant and black rhinoceros, we find the big game still enjoying their natural range. Another factor favoring our knowledge of the ranges of the big game mammals is the comparatively fixed character of the distribution of most species: because of the equable climate and the permanence of the grass and other vegetation there is little tendency to seasonal or other migrations. In habits most of the animals now under consideration live on open plains or at times on plains bearing a widely scattered growth of thorn trees or bush in which cover they are readily detected and can themselves detect their enemies by sight alone. The chief game animals such as gazelles, hartebeests, wildebeests, zebras, and some others, are open-plains animals and cannot be driven into thick cover even by an army of pursuers. These animals have developed great fleetness of foot and trust to speed alone to escape a dangerous enemy. The open plains are therefore their haven and their home, and they are easily detected wherever they occur, so that their distribution is now well known. Since the beginning of the present century great numbers of sportsmen have annually gone on *safari* in Equatorial Africa, and today the distribution of the bush and forest species, such as the buffaloes, bongos, bushbucks, giant pigs, duikers, elephants, etc., as far as their haunts are concerned, is quite as well known as that of the plains antelope. This unusually favorable combination of circumstances has enabled us to map out with a high degree of accuracy the actual distributional limits of big game mammals in Equatorial Africa.²

FACTORS CONTROLLING DISTRIBUTION

Notwithstanding the completeness of our knowledge of the facts of such distribution we are at a loss to explain them. In all species there is a natural tendency to enlarge the area of distribution, but it is held in check by forces of whose manner of control we know little except in a general way, or in the case of some few species only. We see the ranges of species brought to a halt at certain points by high mountain chains, sand deserts, great forests, large rivers, lakes, and seas. Climate, we know, is one of the chief barriers to areal spread, but of the manner of its operation other

¹ For notes on the preservation of big game in Africa and for maps of the game preserves in British East Africa and other British possessions in Africa see J. Stevenson-Hamilton's "Animal Life in Africa," London, 1912.—EDIT. NOTE.

² For maps of the range of various big game mammals see Roosevelt and Heller's "Life Histories of African Game Animals," 2 vols., New York, 1914. Attention may also be called to the bibliography of eastern Equatorial Africa at the end of Volume 2.



FIG. 2—Scene in the great Rift Valley of East Africa. Mount Longonot, a lofty volcano with perfectly preserved crater, in the background. (Illustrations, unless otherwise stated, from photographs by the author.)

than in limiting certain vegetable growths which may furnish food or cover to the species concerned we know little indeed. An important rôle in the limitation of mammal ranges in Equatorial Africa is played by unseen foci, by disease germs or blood-sucking insects which transmit them, such as various species of tsetse flies, ticks, mosquitoes, etc. The purpose of the present paper is to demonstrate the range limitations of big game mammals in Equatorial Africa through the operation of certain of these controls—the great geographical barriers such as the high mountain escarpments of the Rift Valley, the great rivers, the Nile and Tana, the deserts of British East Africa and Abyssinia, the forests, and the climatic barriers.

THE SAHARAN BARRIER

The African fauna of today has been preserved to us through the barrier of the vast Sahara Desert, which through a long period of time has prevented the more modern animals of Asia and Europe from reaching Africa proper. The real Africa, or the Ethiopian region of biologists, comprises only that part of Africa south of the Sahara Desert. North Africa, which borders the Mediterranean, has a Eurasian fauna. The chief big game mammals—sheep, ibex, and deer—are generically the same as those inhabiting Europe and Asia and only distantly related to the antelopes of Ethiopia. During middle Tertiary time, however, antelopes of several genera, hippopotamuses, lions, hyenas, and other true African mammals lived in Europe and Asia also, and this fact has led to the inference that Africa during that remote period obtained its present fauna from Eurasia. The evidence, however, is very one-sided, for Africa proper—Ethiopia—has practically no fossil record to balance against that of Eurasia; hence the theory of Eurasian derivation is accepted as plausible only. Africa is a very old continent and has without doubt been the birth-place of many groups of animals and plants.

ETHIOPIA AND ITS TWO FAUNAL REGIONS

The Ethiopian realm of zoölogists has two main faunal regions, the rather dry plains and plateau country of East and South Africa, which is characterized by its great herds of game, and the great forested area of the Congo Basin, which has a humid climate and a heavy rainfall and where game animals are few in species and individually very rare.³ The former region, South Africa and East Africa (the area as far west as Lake Tanganyika and the Nile and as far north as Abyssinia), shows a certain homogeneity in climate, vegetation, and fauna and is the big game region of Africa. The whole of the eastern half of Africa rises in a series of plains and plateaus from the coast westward towards the interior, where much

³ Compare the note in the "Geographical Record" for this month on "African Fish Fauna and Faunal Regions."—EDIT. NOTE.

of the land reaches elevations of 4,000 to 7,000 feet. This elevated interior tract, which extends from Abyssinia to the Cape region of South Africa, has an agreeable climate, free from tropical fevers, and it will some day support a large Caucasian population. The white settlers who have thus far established themselves here are leading comfortable, contented lives and are engaged in successful agriculture and experimental stock-raising. This, indeed, is not the Africa of popular imagination. By most people Africa is visualized as a land of low tropical jungle in which lurk



FIG. 3—The Rift Valley at Lake Elmenteita. Volcanic cone in the background. (Photo by C. E. Akeley.)

deadly fevers fatal to the white man. Such an incomplete and partial picture, doubtless established by Stanley's vivid account of his travels in the Congo Basin, is, however, being rapidly dissipated today by the numerous and annually increasing accounts of travel and adventure in eastern Africa.

The Life Zones of Eastern Equatorial Africa

Without doubt the most logical way of describing the distribution of big game mammals in eastern Equatorial Africa is by a discussion of the life zones we find there. By this, the ecological method, we shall associate the floral features, the climate, and the geological formations with the animal life and show some of the influences these features have on big game distribution. Human relationships will also be briefly noted.

THE COAST ZONE

Bordering the eastern coast on the shores of the Indian Ocean is a narrow strip of land of tropical appearance as regards its tree growth and climate (map, Fig. 1). The width of this strip is not more than fifteen miles on an average, and it terminates at Lamu, north of which the second, or desert zone, actually reaches the seashore. The climate of this coast strip is equable and somewhat moist, owing to the presence of the sea, so that the cocoa palm is here a dominating feature of the landscape.



FIG. 4—Looking down into the Rift Valley south of Lake Baringo. (Photo by C. E. Akeley.)

The cocoa palms are in a semi-cultivated state, but beyond the territory occupied by them the land is thickly bushevered, with occasional groups of the forked dûm palms and the gouty baobab tree. There are definite rainy and dry seasons, but the country never has a really arid appearance. During the rainy season the bushes blossom and trees such as the baobab leaf out into life. The coast at Mombasa is a coral formation, the town itself being located on a coral island set in a deep indentation of the coast and guarded on its sea side by numerous coral reefs on which the breakers pound. Inland a short distance is a yellowish sandstone of Triassic age, and this formation continues into the arid desert area a short way. Immediately beyond the coral formation the land rises gently and slopes up to the desert plateau, which is in many places flanked by a low escarpment a hundred feet or so in height.

MAMMALS OF THE COAST ZONE

The sable antelope, the trophy most prized by the sportsman, occurs only in this narrow maritime zone in Equatorial Africa, and here it reaches its extreme northern limit. Farther southward, from Lake Tanganyika to the Cape region, it is a fairly common species, but on the coast of British East Africa it is of rare local occurrence, and few indeed are the sportsmen who have bagged it in this district. We know of no explanation for the fact that in South Africa the sable antelope inhabits cool uplands, while in Equatorial Africa it is found only in the low, hot coast region. Buffaloes still occur in the bush of the coast, but they are now few in numbers and seem never to have regained their high place in faunal society since the rinderpest swept the great herds away thirty years ago. Formerly elephants wandered through the bush of the coast zone, but they have long since been shot for their ivory by traders, to whom the coast ports have been accessible for at least two centuries. Haunting the coast forests, formerly the home of the giant among living mammals just referred to, is a diminutive antelope no larger than a hare and known as the blue duiker. It is a distinct race peculiar to the coast zone, and no representative of the species is to be found inland until we reach the Nile watershed some four hundred miles distant. One of the hangers-on in the zone is Haggard's oribi, a small antelope which lives on the grassy flats bordering the zone on its inland or desert side. A host of other game mammals occur in the coast district, but none are peculiar to it. Bush pigs, bushbucks, hyenas, leopards, and occasional lions are to be met with here.

THE COAST PEOPLES: SWAHILI AND DURUMA

That comparative accessibility of the coast which encouraged the extermination of its economically valuable big game shows itself also in foreign influences on the native population. Several tribes of Bantu stock inhabit the coast district, but the predominating and best known is the Arab-modified Swahili, who has been the source of transport for all caravans to the interior from the very earliest organization of exploration and trading *safaris*. His language, Ki-Swahili, has gone with him and is now a *lingua franca* for all Equatorial Africa from sea to sea. The Swahili occupy the coast ports, islands, and larger towns, but there are still living several primitive tribes over much of the area planted to the cocoa palm. One of these, the Duruma, who occupy territory near Mombasa, probably live today much as the Swahili did before the Arabs came among them, bringing Mohammedanism and such Mohammedan arts as the building of mud-walled and stone houses. The Duruma live in small villages in thatched huts built in the groves of cocoa palms. Both the Swahili and Duruma are agricultural tribes, but they vary their diet by fish when such food is procurable at the seashore.

THE DESERT, OR NYIKA, ZONE

Flanking the coast strip and covering an immense area inland we encounter next the desert, or nyika, zone. The term *nyika*—the country of the Wanyika—is used in Swahili to signify jungle or thornbush country. It has a width of from two hundred to as much as one thousand miles in its greatest eastward extension, where it embraces not only the coast drainage but much of the Upper Nile watershed as well. In altitude it ranges from 100 to 3,000 feet above sea level. The climate over this vast area is hot and dry, and the rainfall is not more than a few inches annually and is limited to a short period, sometimes less than a month. The nyika is not a desert in the strict sense but a bush region with open spaces of sandy soil between the scattered vegetation, much like the American deserts in California and Arizona. The bush and tree growth is specialized to resist dryness and remains leafless and dormant throughout most of the year, only resurrecting itself to leaf and blossom after the short rainy season. A great many of the species of desert bushes are members of or closely allied to the genus *Acacia*, which is a dominant African type. Several euphorbias of cactuslike appearance and usually miscalled cacti by the sportsmen have established themselves widely over the nyika. The two most prominent trees are the branching dûm palms and the gigantic trunked baobab, the latter usually leafless and desolate in appearance. Forming the undergrowth in this bush world are the formidable spike-shaped sansevierias and aloes. The British East African portion of the nyika is covered by a bright red soil derived from the granitic (gneiss) rocks which are to be seen as outcrops or low hills in many parts of the desert plain. North of the Tana River this red soil is replaced by a yellow sandy variety that is again met with in the Nile region in the same zone.

MAMMALS OF THE NYIKA ZONE

The streams which cross the nyika are marked by wide dry sandy beds and low banks, the water seldom or only after heavy rains reaching the surface and forming a true river. The margins of these dry streams are usually well defined by a narrow fringe of dûm palms and acacia trees. Aside from springs the game animals which inhabit the region obtain their water from holes which they themselves dig in the sandy bed of the streams in those places where the water is not more than two or three feet below the surface. The Tana River, which cuts direct through the desert from the base of Mt. Kenya to the Indian Ocean, is a permanent supply for the numerous herds living along its banks. With the exception of the Nile it is the only perennial river which traverses the nyika zone. Some few, however, of the game animals have become highly specialized for existence in the desert and have quite given up the habit of drinking water



FIG. 5.



FIG. 6.

FIG. 5—Giant euphorbia tree, Loita Plains, British East Africa.

FIG. 6—The baobab, a characteristic tree of the nyika, or desert, zone, and leafless most of the year.
(Photo by C. E. Akeley.)

even when it is available. Such species are the gerenuk—the flamingo among antelopes, being chiefly neck and legs—the lesser koodoo, the diminutive dikdik, the rock-haunting klipspringer, and several others which live outside the range of our territory. The species of antelope just mentioned, with the exception of the dikdik and klipspringer, are peculiar to the nyika. Others which hold this distinction are the oryx, Grévy zebra, and reticulated giraffe; and these are limited to the nyika track north of the Tana River, which forms also the southern barrier for the Somali wart hog and the Hunter antelope, and the large-snouted dikdik. This river makes a singularly sharp barrier for such a species as the Hunter antelope, which is found only in the immediate vicinity of the river and only on its northern bank. This species is a distinct one and is the sole living representative of its genus. The Somali wart hog is also structurally a distinct species from the common wart hog. On the basis of this zoölogical evidence we are justified in assuming that the Tana River has been a barrier to these game mammals throughout most of the later Tertiary age. South of the Tana River we find occurring as peculiar forms the fringe-eared oryx, Thomson gazelle, Coke hartebeest, white-bearded wildebeest, and Masai giraffe.

CROCODILES AS BARRIERS TO DISTRIBUTION

All large streams in tropical Africa are infested by crocodiles, which patrol the water's edge vigilantly for such prey as game mammals, which they seize by the muzzle or leg when in the act of drinking. The victim is then pulled into the stream and under the water, where it is devoured. Through fear of these reptiles game animals approach the margin carefully and seldom or never enter or swim across large rivers. An American sportsman, Mr. Fleischmann, actually witnessed the drowning of a full-grown rhinoceros by crocodiles in the Tana River. It was not possible to see in the dark water how many crocodiles had hold of the rhinoceros, but the huge beast was gradually pulled under the surface by some strong force. But the rivers of Equatorial Africa have not been a barrier to the distribution of a majority of the game mammals, and such occur on both sides of rivers ranging over the whole valley. Some few, like the sitatunga, are actually water-loving species and swim fearlessly, at least in Victoria Nyanza. Other species, like the Nile lechwi and the bushbucks and to a less extent the waterbucks, frequent reedy swamps on the margins of lakes and rivers. His gigantic size and fearsome tusks preserve the hippopotamus from attack by crocodiles, and the elephant is immune in much the same way. Crocodiles, however, have instilled a wholesome dread of large bodies of water in the minds of many antelopes and other ungulates, which has acted as an important deterrent to their distribution across such barriers throughout a long period of time.



FIG. 7.—The crocodile, the guardian of the Tana. The Tana River is the chief barrier to big game animals in eastern Equatorial Africa. (Photo by C. E. Akeley.)

TRIBES OF THE NYIKA ZONE

The Tana River acts to some degree as a barrier to man as well as to big game animals: the raiding Somali does not penetrate south of it. Scattered through the nyika zone in a few favored places where there are permanent water holes may be found a few families of the Wanyika tribe, who till the soil during the short rainy season and harvest a small variety of crops on which they subsist. The higher hills which rise above the plain in certain places, as in the vicinity of the station of Voi on the Uganda railroad, accumulate more moisture on their summits than the surrounding desert, and they are inhabited by another tribe, the Wateita, who find them a fertile field for the raising of millet, maize, bananas, and vegetables. Formerly the indigenous tribes found the mountain tops a secure refuge from their powerful warlike neighbors, the Masai, who once raided over the nyika as far as the sea itself. Inhabiting the upper edge of the nyika, where the highland grassy veld begins to encroach on the desert, we find another tribe, the Wakamba, who, though agricultural, do considerable hunting of game with bows and poisoned arrows. These people are fond of the flesh of game animals and are expert hunters and beaters, the latter method being one of their modes of capture. These people have the custom, unknown among other East African tribes, of filing down the incisor teeth to sharp points. The practice is usually associated with cannibalism, and with such the Wakamba have been credited, but the accusation is denied by Hobley.⁴

THE NILE NYIKA

The desert nyika extends far westward past Lake Rudolf to the Nile and then northward, embracing the vast expanse of the Sahara itself and becoming gradually more desolate and arid as we proceed northward from its southern border at Albert Nyanza. In the Upper Nile Valley, in the Lado Enclave and northern Uganda, the nyika lies at a general level of 3,000 feet and consists of grass-covered plains dotted at wide intervals with small trees and bushes. The rainy season is short but sufficient to produce a heavy growth of tall grass, which in the dry season is systematically burned by the natives. Only a few of the hardier or more favorably situated trees can withstand this annual ordeal by fire. The Nile itself flows through the region like a great newly cut canal without bordering forests or any marked luxuriance of vegetation except papyrus to mark its course. The characteristic trees of the Nile nyika are various species of acacia and other leguminous trees, the peculiar *Kigelia*, the *Borassus*, or fan palm, and the dôm palm. The climate in the dry season is hot and dry and decidedly more trying to a European than that of equal elevations in British East Africa. During the short rainy season the moisture

⁴ C. W. Hobley: *Ethnology of A-Kamba and Other East African Tribes*, Univ. Press, Cambridge, 1910; reference on p. 18.

produces a humid, depressing climate quite as uncomfortable as that of the Congo forest region. The soil over much of the region is of the usual bright red (ferric oxide) clay variety so widespread in Africa.

THE NILE AS A BARRIER

The Nile is a more important barrier to big game mammals than the Tana River; in fact it is the most important river barrier in all Africa. No fewer than five of the largest game mammals of eastern Africa occur on the eastern bank but fail to cross the river. These are the black rhinoceros, the Cape eland, Burchell's zebra, the five-horned giraffe, and the red-fronted gazelle. On the opposite bank we find an equally important assemblage of big game which are barred by the Nile from farther extension eastward. The most important of these species are the white rhinoceros, the giant eland, and the Congo giraffe. Living on both sides of the Nile and occurring in abundance we find such species as the Nile buffalo, Cape elephant, Nile kob, harnessed bushbuck, defassa waterbuck, Nile lechwi, yellow reedbuck, oribi, bush duiker, etc. All of these species, which are now found on both sides of the Nile, probably represent the older residents in the region, the more recent arrivals such as the rhinoceroses and elands having had less time to effect a crossing.

The Nile along most of its course is a really formidable barrier, being wide and lakelike in expanse, the margins boggy and overgrown by a heavy growth of papyrus and other aquatic plants which form an impassable barrier of floating *sudd*. Animals as large as elephants have been found mired and drowning in this treacherous plant growth. Between the Dufle rapids and Gondokoro the river is greatly narrowed, so much so that at a few spots it seems possible for large mammals to cross, but apparently they do not try the adventure, perhaps owing to fear of the swift current. It is evident from the presence of distinct genera of rhinoceroses on opposite banks that the Nile has been an open stream of considerable size for a great length of Tertiary time.

NATIVES OF THE NILE NYIKA

The natives of the Uganda portion of the Nile are chiefly members of the Acholi and Bari tribes, who live in small stockaded villages and are agricultural. Lower down the river in the Sudan portion we meet with other tall, slender Nilotic peoples, like the Dinkas and Shilluks, who, like the Masai of the Rift Valley, are largely pastoral. These nude people protect themselves against mosquitoes by smearing their bodies with wood ashes, which gives them a weird and ghostly appearance.

THE HIGHLAND VELD ZONE

The highland veld zone may be described as the sportsman's paradise. It is a region of grassy plains, well watered by a moderate rainfall and

lying at altitudes of 4,000 to 8,000 feet. The climate is delightfully cool at night notwithstanding the torrid sun of the day. Great herds of game feed on the grassy plains and live there the year round. Cutting through this zone from north to south and dividing it into two sections is a great trough, the Rift Valley, of recent tectonic origin. The Rift Valley in British East Africa is bounded by two great escarpments which rise from 2,000 to 4,000 feet above the floor of the valley. The escarpments are forest-clad, in marked contrast to the grassy plains of the Rift Valley, with its numerous small lakes of independent drainage and often saline waters.



FIG. 8—Hippopotamus herd on the Tana River. (Photo by C. E. Akeley.)

Northward the Rift Valley descends rapidly from its culmination of 6,000 feet at Lake Naivasha to the low desert plains of Lake Rudolf, which is less than 1,000 feet in altitude. The Rift Valley with its independent local drainages separates the coast drainage from the Nile but is not a very important physical obstruction to game animals. A few antelopes, among which may be mentioned the lelwel hartebeest, the defassa waterbuck, the five-horned giraffe, the Uganda kob, and the sitatunga, find here their most eastern range, the last two species stopping on the Mau Escarpment west of the Rift but the first three mentioned passing this barrier and stopping in the Rift Valley itself. Proceeding westward from the Mau Escarpment the highland veld region continues over much of Uganda, occupying all of the basin of Victoria Nyanza and the lower slopes of the Ruwenzori massif. The Uganda veld is a region of tall grass and is quite devoid of plains-loving antelopes, being chiefly the haunt of buffaloes, ele-

plants, bush pigs, duikers, sitatungas, bushbucks, and other cover-haunting species.

MAMMALS OF THE EASTERN HIGHLAND VELD ZONE

Reverting to the British East African portion of the highland veld zone, which includes the Rift Valley and all the veld lying east of it in the coast drainage, we encounter as peculiar species the Thomson gazelle, the Coke hartebeest, the white-bearded wildebeest, and the diminutive steinbok. Bordering the rivers and streams which dissect the veld are scattered groves of green-barked, flat-topped, and other species of acacia. A remarkable type of tree which attains its perfection in the highland veld is the *Euphorbia candelabrum*, of weird, cactuslike appearance, leafless, and made up of angular succulent stems. It grows to gigantic size, often producing an immense globular branching crown as much as a hundred feet across and having a trunk several feet in circumference. No palms occur in this zone except a dwarf species of the wild date (*Phoenix*).

MASAI, KAVIRONDO, AND BAGANDA TRIBES

In the old days the powerful cattle-keeping Masai, migrating southward along the pasture belts, occupied the Rift Valley and the highland veld of the coast drainage as well as the Laikipia and Athi Plains and also held sway far southward on the grassy slopes at the base of the lofty snow-capped Kilimanjaro. They were the lords of Equatorial Africa, until the rinderpest reached the continent, swept their cattle away, and so weakened their military power. They are a pastoral people and depend for food on the milk and blood of their herds, eating little or no vegetable matter nor the flesh of game animals. The ravages of the rinderpest in 1890 reduced their herds to remnants and their powerful standing army of warriors to a mere handful. The white man soon afterward entered the country and has now established himself securely in these pleasant highlands.

Living in the Nile drainage on the eastern shores of Victoria Nyanza are the Kavirondos, a tall, athletic, agricultural race who till the soil in fields won from the forests flanking the Mau Escarpment and the Nyanza plain. The Kavirondos live in that innocent state which prevailed in the Garden of Eden, but on the opposite side of Victoria Nyanza we find a well-clothed race, the Baganda, who have been subject to a dynasty for several centuries and have reached the state of culture which expresses itself in extreme forms of polite speech and servile deportment. These people, like most African tribes, are agricultural. Bananas and sweet potatoes are their staples of existence, and their dress consists often of bark cloth made from a tree common in the country.

THE HIGHLAND FOREST ZONE

Bordering the highland veld on its upper levels we encounter the highland forest. There is no intermediate parklike country between



FIG. 9.



FIG. 10.

FIG. 9—Masai giraffe and Wakamba skinners, Athi Plains, Roosevelt expedition.

FIG. 10—Domesticated common eland in a Meru village.

forest and grass plains. The forest flanks the grass land as a solid wall quite as dense on its outer face as in its interior. How this sharp line of grass plains is maintained against the encroachments of the forest is a biological mystery. There is no burning of grass plains in this high region, the grass being short and the climate as a rule too wet for fires. The forest begins at an altitude of 6,000 feet and ranges up to 11,000 feet on the highest mountains such as Kenya and Ruwenzori.⁵ Its quality is quite variable, the lower portions being composed of olive trees, albizzias (allied to acacias), crotons, the yellow-woods (African yew), *Podocarpus gracilior* and *P. thunbergii*, the Ibean camphor (*Ocotea usambariensis*). On dry slopes a large juniper (Kenya cedar) forms pure forests in places; on damp slopes giant tree ferns and fig trees are common. The upper levels of the forest are composed of an alpine bamboo, *Arundinaria alpina*, quite pure in growth, bordered at its upper limits by *Hypericum* trees, a close relative of the Saint-John's-wort of our gardens.

MAMMALS OF THE HIGHLAND FOREST ZONE

The East African mammals dwelling in the forest are bushbucks, red duikers, bush pigs, buffaloes, elephants, and leopards. Along with them are two very rare species which remained for many years unknown. They are the bongo (an elandlike antelope) and the giant pig. Both animals have recently come from the Congo by way of intervening forest areas. They have crossed the barrier of the Rift Valley from the Mau forests and now are found as far east as the slopes of Kenya, where they dwell securely in its dense forest covering. These two species have been prevented from reaching the extensive forests of Kilimanjaro by the lack of intervening forest belts.

ALPINE REGIONS

Above the forest zone at 11,000 feet altitude on Kenya an open moorland or alpine region occurs, and this same type of country is found on the top of the Aberdare Range, on Kilimanjaro, and on the Ruwenzori Range. The ground at these high elevations is boggy and covered by alpine plants such as mosses, alchemillas, brambles, heathers, immortelles (*Helichrysum*), giant groundsels (*Senecio*), and lobelias of several sorts. The groundsels are gigantic forms and treelike in habit and very different from our own, which are insignificant roadside weeds. The very largest of the game mammals, the elephant, reaches this high range as a transient visitor, but is never resident at such an altitude. The buffalo is also an occasional intruder. Living in the zone is a race of the bush duiker and an occasional leopard and serval cat. Certain species of the rock hyrax are peculiar to this zone, and great numbers of small rodents and shrews make this lofty moist region their home.

⁵ See note in "Geographical Record" for this month on "New Observations on Mount Kenya."—EDIT. NOTE.



FIG. 11.



FIG. 12.

FIG. 11—Dry river of the nyika zone, bordered by dùm palms.

FIG. 12—Kavirondo field and hut, showing Kakamwega forest in the background. This is the easternmost extension of the tropical Congo forest in Africa.

TRIBES OF THE MOUNTAIN FORESTS

No true forest tribe occurs in the high mountain forests of eastern Equatorial Africa but we find dwelling there the Wandorobo people, helots of the Kikuyu and Masai tribes, who have taken to the forest, where they subsist on the game they catch in pits and on the stores of wild honey they



FIG. 13—Batian, the summit peak of Mount Kenya, 17,200 feet in altitude. Taken at snowline, 14,500 feet altitude.

find in trees. These people have no definite tribal organizations but live in small family communities: they probably represent remnants of older, subjected tribes. On the extreme lower edge of the forest bordering the grassy plains, in the Kenya region, we find several large agricultural tribes of whom the Kikuyu are the best known. They grow millet, sugarcane, cassava, potatoes, maize, beans, squashes, and other vegetables. The activities of the Kikuyu bear an important relation to the forest and its wild life: constantly clearing new land in order that luxuriant crops may be obtained, they steadily encroach upon the forest. It has been estimated



FIG. 14.



FIG. 15.

FIG. 14—Alpine vegetation of Mount Kenya, growing at an altitude of 13,000 feet. Giant lobelias.

FIG. 15—Bamboo forest of Mount Kenya at its upper limit, 11,000 feet. In the foreground, immortelles in blossom.

that the forest belt of the Aberdare Range has recently been diminished at the rate of about half a mile yearly. On the forested slopes of Kilimanjaro, Mount Elgon, and the Ruwenzori Range are numerous other agricultural tribes similar in physical characteristics and habits to those of Kenya. These tribes are local in range, speak distinct languages, and have little intercourse one with another.

THE TROPICAL FOREST ZONE AND ITS MAMMALS

A forest quite as dense as that of the high mountains but composed of tropical tree species is found occurring in patches through Uganda and as far eastward as the base of the Nandi escarpment. It is really a part of the great Congo forest, which sweeps across Africa from the west coast to the base of Ruwenzori. Large patches of tropical forest are found in Uganda on the shores of Victoria Nyanza: the easternmost outlier is the Kakamwega forest lying northeast of Victoria Nyanza in the basin of the Yalo River (foot of the Nandi escarpment). A great number of species of trees are found assembled in this tropical forest of Uganda. Many of the giant trees are figs, others are zapotes, but none are related to our own forest trees. The killer fig, which is parasitical on the trunks of trees in its youth and strangles them later, becoming a many-branched and many-stemmed tree, is a loathsome type common to the forest here. Palms are rare, but bananas of several species are abundant and replace them. Tree ferns also occur but are less numerous than in the highland forest. The Uganda forests were the highways by which the bongo and giant pig reached East Africa. These two species still occur in these forest bridges as well as in the great Congo forest itself. Besides these species there are elephants and several small forest duikers and bushbucks. Peculiar to the Congo forest but living on its eastern edge chiefly is the okapi, a recently discovered ungulate allied to the giraffes but very little known because of its secretive habits and the dense nature of its haunts. Also confined to this tropical forest but more widespread than the okapi are the chimpanzees. Their distribution practically coincides with the entire tropical forest area of Africa. Not so, however, does the range of the gorilla, which is limited to the Cameroons and Ogowe districts of the west coast and is absent from the whole Congo Basin. One species of gorilla is found in a small area of highland forest on the volcanic Mufumbiro mountains northeast of Lake Kivu. What is the explanation of the limited and widely separated distribution of the gorilla, the most powerful of the anthropoid apes, and the widespread range enjoyed by his smaller kin the chimpanzee?

THE TRIBES OF THE CONGO FOREST

Dwelling in the Congo forest proper there are several tribes of normal size of common Bantu stock, agriculturalists who are subject to a tribal

organization of considerable complexity; but the most interesting people in the Congo are the pygmies. They are a shy forest folk who avoid oppression by keeping aloof and away from their larger and more powerful negro neighbors as well as from the few white men who travel through their domain. In habits they resemble the okapi, with which they share their territory.

Summary

It is climate that exerts the chief control over the distribution of animals in Equatorial Africa. The five zones which we have here employed in defining the ranges of game animals and native tribes have been established on a climatic basis. Coincident with climate are distinctions of flora on which the animals are dependent for food and protection. Temperature first, and then moisture are the most important climatic elements. Temperature is dependent chiefly on altitude, and our zones, inasmuch as they are primarily defined by temperature, have very definite altitudinal boundaries and lie one above another. In accord with the banded orographical structure of the region we find the life zones disposed in ribbonlike arrangement and paralleling the coast in a general way the whole length of the eastern side of the continent. Summarizing the five life zones briefly (map, Fig. 1), we have first the narrow coast zone rising from sea level to 500 feet or so. Above this the great desert, or nyika, zone extends from 500 feet to an altitude of 3,000 feet. Above the desert the highland veld rises from 3,000 to 8,000 feet, its altitude giving it a cooler and moister climate. Rising still higher above the plateau there is a highland forest area on mountain slopes and summits covering the altitudes between 8,000 to 11,000 feet, where the climate is decidedly moister and cooler. The area lying above the tree zone, which is alpine in the character of its plant growth and climate, is infinitesimal in Africa in comparison with the other zones. In Uganda we have an area or zone, the tropical forest, which is dependent on soil conditions rather than altitude. Here we find a dense tropical forest covering certain areas within a grass veld region. To some extent this area is artificial, the grass veld having been extended by native agricultural methods at the expense of the forest area. Within these zones are two important river barriers, the Nile and the Tana, which subdivide the nyika zone, as their waters form important barriers to big game mammals. As a barrier these rivers are here only of great importance to the distribution of big game, smaller mammals being much less effected. Reptiles, birds, other animals, and vegetation are scarcely effected at all by these rivers in their distribution, though they are subject to the zonal or climatic barriers quite as much as are big game mammals. There is no region in the world where large mammals have been so limited in their distribution by rivers as in Equatorial Africa.

THE OUTLINE OF NEW ZEALAND

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A thorough appreciation of scenery involves not merely the perception of its beauty but also some understanding of its meaning in connection with the history of the earth. This meaning is not always perfectly obvious, but the real seeker is not dismayed by the difficulty of the quest. The shores of New Zealand are a veritable treasure house of beauty, rivaling in their charm the glaciers of the southern island, the geysers of the northern, and the mountains, lakes, and gorges of both. What story is it that these fascinating coasts reveal?

PECULIARITIES OF THE COAST LINE

An examination of a map of the islands of New Zealand (Fig. 1) shows us a number of peculiarities in the outlines which demand explanation. The sprawling North Island and the more compact but narrow-waisted South Island suggest a decipherable coast history. Numerous embayments characterize certain areas as the loci of submergence; but, to the reader of an outline map, the intervening stretches of coast are generally enigmatical. Such portions, however, yield more information to the student in the field.

In a previously published article¹ the writer called attention to the occurrence of multicycle fault coasts, or, in other words, coasts initiated by faulting and subsequently uplifted intermittently during their modification by wave action and subaërial agencies.² It is proposed now to make a rapid survey in order to classify the coastal types represented.

The Broad Outlines

GEOLOGIC HISTORY

An investigation of the broad outlines of the New Zealand land masses necessitates an excursion into the realm of historical geology, and it becomes necessary to define what is to be understood by the name "New Zealand." To some it would mean not only the existing land but also any land that has ever been emergent on the site of the present New Zealand area; and this would be a perfectly justifiable view if it appeared that

¹ C. A. Cotton: Fault Coasts in New Zealand, *Geogr. Rev.*, Vol. 1, 1916, pp. 20-47.

² In the article referred to (p. 21) a somewhat misleading statement was made that fault coasts had not been recognized by geomorphologists of the American school. The statement was intended to refer to the non-recognition of the type in systematic classifications of coast forms in textbooks and similar works; but, as it stands, it does injustice to some workers, notably Vaughan and Lawson, who have indicated an origin by faulting for the coasts of Cuba and California respectively.

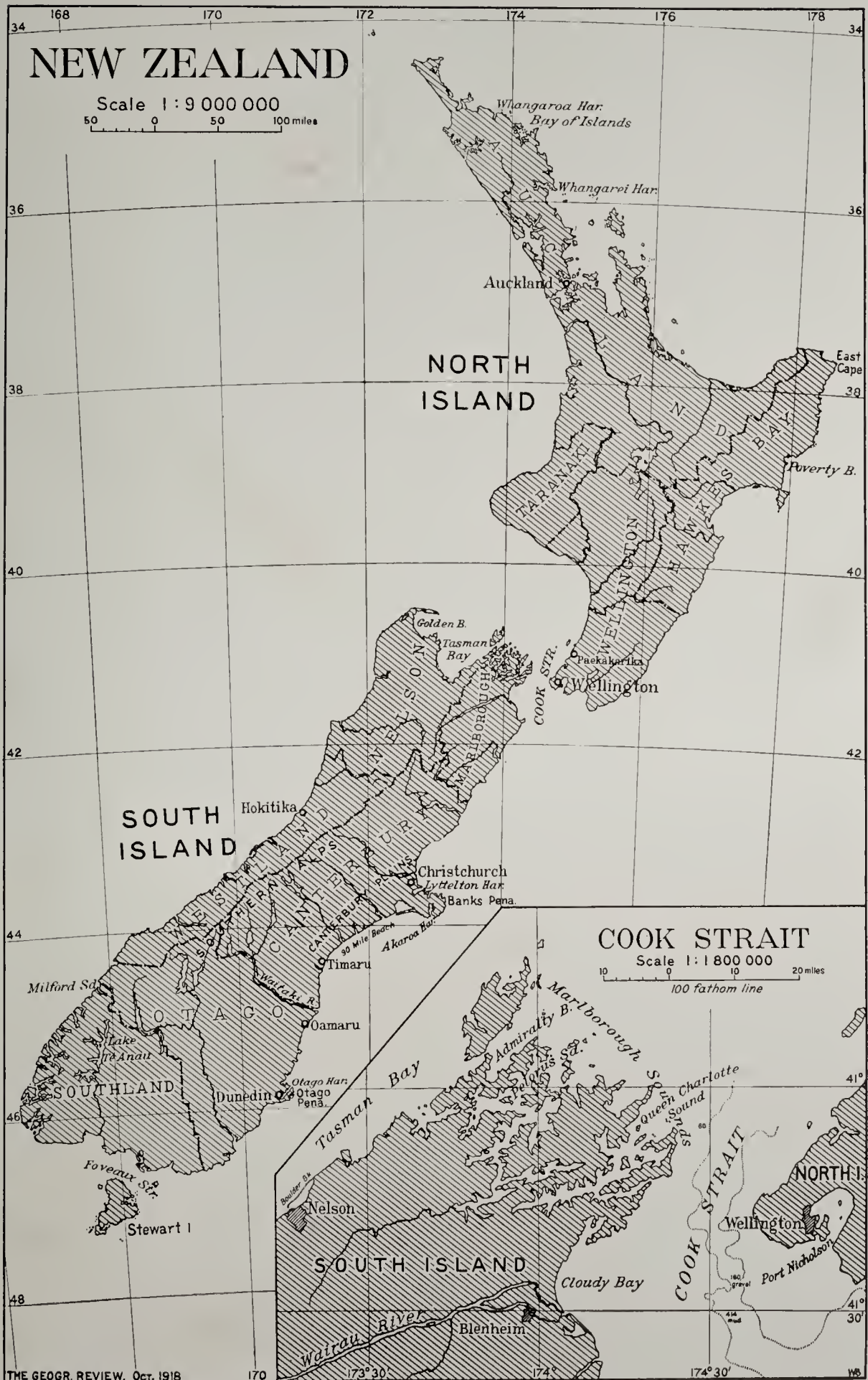


FIG. 1—Map of New Zealand showing the places and features mentioned in the text. Scale, 1:9,000,000. The inset, 1:1,800,000, shows the submarine channel of Cook Strait.

the axis of such land had always coincided more or less exactly with the axis of the present-day New Zealand—if, in other words, there were a recognizable nucleus about which the land had been built during a succession of submergences. But such is not the case.

In late Paleozoic and early Mesozoic times the site of New Zealand was the locus of accumulation of vast masses of coarse-grained sediments. An orogenic period followed, but nothing is known as to the extent of the resulting land except that it was of large dimensions. Its outlines are quite unknown, and it seems inadvisable to think of it as an ancestral New Zealand. Next followed a period of planation succeeded by Cretaceous and Tertiary sedimentation,³ and it was only at the end of this that there arose, as a concourse of earth blocks, the initial forms of the present New Zealand land mass.⁴ This, then, is New Zealand for the geologist, but its outlines were undoubtedly very different initially from those of the group of islands constituting the New Zealand of geography.

PRESENT-DAY NEW ZEALAND

To some small extent the present outlines may be survivals of the boundaries of the nascent land modified by later regional uplift and depression as well as by weather and waves. On the other hand some parts at least of the coasts are the sequential forms—generally multicycle sequential forms—developed from lines of fracture bounding a residual mass after marginal portions had foundered.⁵ This foundering took place in relatively modern times, perhaps contemporaneously with some vertical movements by which the land has been divided into large differentially moving areas.⁶ Prior to these coast-determining subsidences, though the area of the land was greater, its general outlines, especially in the south, may be assumed to have been roughly similar to those of modern New Zealand; for the axis about which the constituent earth blocks are heaped coincides in a general way with the trend of the existing land, and the low-lying blocks, generally speaking, are marginal.

Weak strata, deposited in the period immediately preceding the birth of the New Zealand land mass, survive over considerable areas on these marginal blocks because of the lowly position which they occupied with respect to base level during a long interval of less emergence than that of the present day. Their marginal occurrence led to a belief among early geological observers, who failed to note the evidence of more recent deformation, that these Tertiary strata were laid down around the coasts

³ C. A. Cotton: The Structure and Later Geological History of New Zealand, *Geol. Mag.*, Decade 6, Vol. 3, 1916, pp. 243-249 and 314-320; reference on pp. 246-248. Reviewed in the *Geogr. Rev.*, Vol. 3, 1917, pp. 83-84.

⁴ *Ibid.*, pp. 248 and 319-320.

⁵ F. von Hochstetter: Geologie von Neuseeland, in "Reise der österreichischen Fregatte Novara um die Erde," *Geol. Teil.*, I, Vienna, 1864, p. xlvii; E. Suess: The Face of the Earth (Engl. transl.), Vol. 2, Oxford, 1906, p. 144; C. A. Cotton, paper cited in footnote 1.

⁶ C. A. Cotton, paper cited in footnote 3; reference on pp. 318-319.

and in the drowned valleys of a land surface carved by erosion from a folded range uplifted in the late Jurassic. The amount of submergence postulated to allow of the deposition of these younger strata was never sufficient, however, to allow of breaks in the continuity of the erosion of the axial mountain mass. Geologists of the latter half of the nineteenth century were not repelled by the idea of still-surviving, one-cycle Mesozoic mountains.⁷

The more modern explanation of the relief, which has been outlined on an earlier page, assigns the differential uplift of the more mountainous areas, as well as the emergence of marginal and intermont districts upon which are still preserved portions of the formerly widespread cover, to a period of uplift and deformation of very much later date—later, that is to say, than the period of deposition of the Tertiary sediments.

RECENT MOVEMENTS

All parts of New Zealand have been affected by recent vertical movements, and a fault coast depressed sufficiently, either as an accompaniment of or at any stage later than the initial faulting, loses most of its individuality as a fault coast and becomes scarcely if at all recognizable as such. It is thus difficult to determine whether all or only some of the outlines of New Zealand resulted from marginal foundering. No definite information on this point has been gained from a study of the continental shelf; but, if a number of variables can be given their proper value, a study of the width of the shelf ought to tell something of the time that has elapsed since the initiation of the coast of which it forms a part. Nothing, however, can be more striking than the rapidity, judged by the rate of contemporaneous subaërial erosion, with which a normal, graded shelf is developed in connection with a young coast.⁸

Cook Strait

New Zealand consists of two main islands and a few smaller ones. To a New Zealander the two large islands are the mainland of his country. So closely are they related that they have not really separate names. On a map they appear as “North Island” and “South Island,” but they are spoken of as “the North Island (of New Zealand)” and “the South Island

⁷ The following passage from Hutton is quoted with approval by Suess: “Mountains with sharply jagged peaks are the exception in Switzerland, and the rule in New Zealand. Waterfalls are rare in New Zealand; a few occur up the deep fjords of the south-west coast, and some few small ones at the heads of the valleys in the great ranges. Yet the Alps of New Zealand are quite as bold and steep as those of Switzerland; their ravines are even more numerous and deeper. The passes are deeper in New Zealand, the valleys much more terraced, and the mountains on the whole more extensively covered by loose débris than in Switzerland. This is certainly truer of Canterbury, Nelson, and Marlborough than of Otago. The explanation lies in the fact that the Alps of New Zealand are *by far the older*. They have been exposed to the action of the weather, at least in part, since the Jurassic period, and many of the larger valleys were already excavated, almost to their existing depth, before the Oligocene period.” (E. Suess *op. cit.*, p. 148.)

⁸ C. A. Cotton, paper cited in footnote 1; reference on p. 37.

(of New Zealand).'' It is as though one spoke of ''the northern part'' and ''the southern part'' of a country.

ORIGIN OF COOK STRAIT

The close political association of the two islands is a result, no doubt, of their isolation from the rest of the world: it has come about in spite of striking physical differences between them—differences which lead to an inquiry as to the origin of the dividing strait. The origin of this channel, Cook Strait, has been ascribed to (1) subsidence, with drowning of the valley of a great river; (2) dislocation; and (3) subsidence of earth blocks.

THE RIVER THEORY

The first of these, the Cook Strait River theory, was advocated by Crawford.⁹ Hutton¹⁰ also ascribed the separation of the islands to regional subsidence. The theory is inadequate, as it involves a great subsidence of all the land bordering the strait, while it is only locally that there is any evidence of subsidence, the most general movements having been of uplift.

THE FAULT THEORY

The dislocation, or Cook Strait Fault, theory was put forward by Hochstetter¹¹ but afterwards abandoned. It was revived by Park.¹² According to Hochstetter—

In the early geological era of New Zealand we may assume that both islands were connected and that one backbone ran continuously from the South Cape to the East Cape. In the present map of New Zealand the integrity of this backbone is broken at Cook's Straits, and a closer inspection will show that there has been not only a simple break of continuity, but a lateral dislocation It is evident, from the rocks being of the same geological formation, that at one period the Pelorus ranges were a continuation of the Wellington ranges. The position of the strata in the eastern ranges of Nelson proves that, whilst the Northern island seems to have remained stationary, some gigantic force has pressed the great mass of the Middle [South] Island to the westward.

Park states that the ''North Island has been thrust eastward some distance relatively to the South Island.'' Of this relative movement of some fifty miles there is no satisfactory field evidence, and the theory has nothing to recommend it.

⁹ J. C. Crawford: Did the Great Cook Strait River Flow to the Northwest or to the Southwest? *Trans and Proc. New Zealand Inst.*, Vol. 7, 1875, pp. 448-451.

Idem: Some Further Proofs as to the Ancient Cook Strait River . . . also a Consideration of the Date at which the Islands were United, *ibid.*, pp. 451-453.

¹⁰ F. W. Hutton: The Geological History of New Zealand, *Trans. and Proc. New Zealand Inst.*, Vol. 32 1899, pp. 159-183; reference on p. 178.

¹¹ F. von Hochstetter: Lecture on the Geology of the Province of Nelson, in ''The Geology of New Zealand,'' by Hochstetter and Petermann, Auckland, 1864, pp. 77-108; reference on p. 106 (first published in *New Zealand Government Gazette*, 1859).

¹² J. Park: Geology of New Zealand, Christchurch, 1910, p. 262.

THE SUBSIDENCE THEORY

Hochstetter's later theory to account for Cook Strait as the result of subsidence of earth blocks was stated as follows:

Indem aber das Land durch Hebung, durch Anschwemmung und durch das Hervorbrechen der Vulcane einen nicht unbedeutenden Zuwachs erhielt, versanken andere Theile gleichzeitig in die Tiefe. Einem solchen Ereignisse mag die Bildung der Cooks- und Foveaux-Strasse ihren Ursprung verdanken.¹³

Hochstetter no longer felt the necessity of assuming lateral dislocation, for, as Suess points out, he was now "aware that the mountain chain which follows the east coast of North Island from East Cape to Wellington is continued on the other side of Cook Strait between the east coast of South Island and the river Awatere."¹⁴

When the evidence is recalled of great differential movement between adjacent blocks on both sides of the strait, both in the mountain-building period and in the later period of vertical movements, it seems highly probable that this explanation of the formation of Cook Strait is the correct one. Possibly the statement ought to be modified by substituting for the phrase "subsidence of earth blocks" another reading "failure of blocks to rise along with the adjacent blocks which now constitute the northern part of the South and the southern part of the North Island." There is, however, a biological argument in the identity, or at any rate close affinity, of northern and southern species of moas for the belief that the dry land areas of the two islands were at one time connected,¹⁵ though, according to Hutton, the differences in these flightless birds are such as to lead him to believe the period of separation to be rather ancient. This justifies the adoption of a tentative hypothesis that at the close of the orogenic movements which gave birth to the New Zealand land mass the dividing strait was not in existence and that the separation of the two islands has taken place subsequently as a result of a subsidence of blocks possibly contemporaneous with the partial subsidence of an adjacent portion of the South Island.

EVIDENCE IN SUPPORT OF THIS HYPOTHESIS

Important evidence of subsidence in the southern entrance to the strait is afforded by a channel of deep water extending into the narrows of the strait, where it is kept open by the strong scour of tidal currents. In this trench the British Admiralty chart¹⁶ records a depth of 414 fathoms, with a mud bottom, but in 160 fathoms the presence of gravel is noted (Fig. 1, inset). In the northwestern open part of the strait, on the other hand, the maximum depth is only about 60 fathoms, for tidal currents are there too feeble to prevent the deposition of sediment in deep water. There is, therefore, a level mud bottom altogether masking the initial form of the floor.

¹³ F. von Hochstetter, work cited in footnote 5, p. xlvi.

¹⁵ F. W. Hutton, *op. cit.*, p. 177.

¹⁴ E. Suess, *op. cit.*, p. 144.

¹⁶ No. 2054 (New Zealand, Sheet 5)

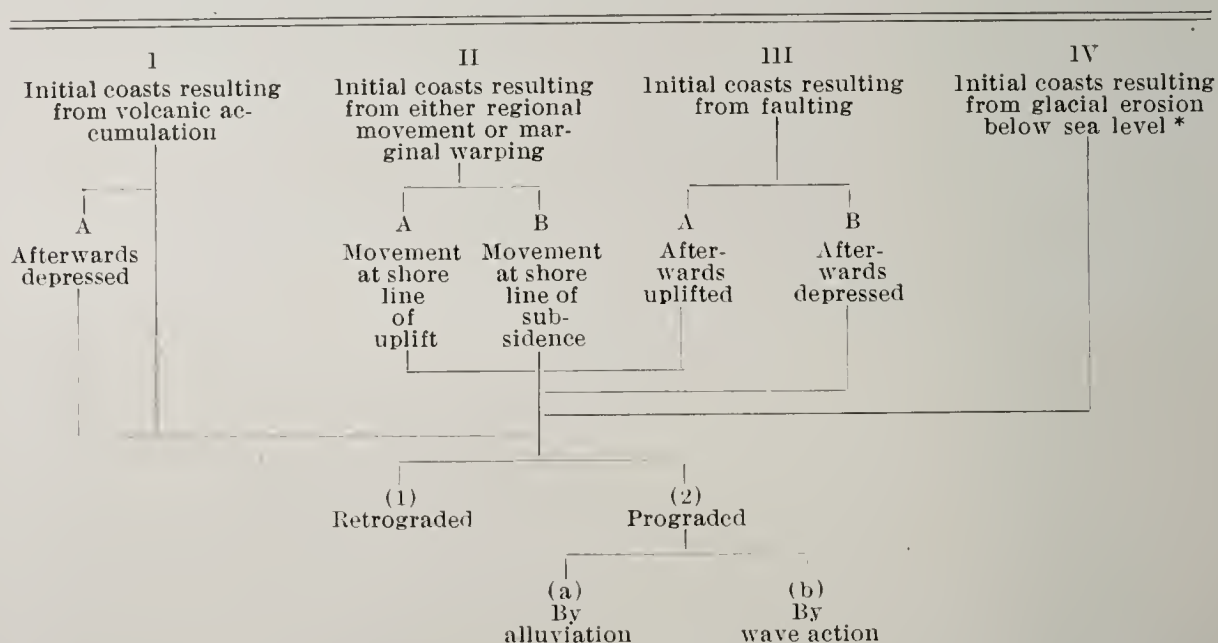
It may be noted in this connection that central New Zealand is a seismic region and that the majority of recorded shocks have been shown to proceed from points beneath the northwestern entrance of Cook Strait.¹⁷ This perhaps indicates that subsidence along faults is still in progress.

The Existing Coasts of New Zealand

The outlines of the two main islands have thus been roughed out largely by fracture, with foundering of land to seaward; but the actual coasts, whether originating entirely in this way or preserving some parts of the outline of the initial land, are sequential forms modified as a result of emergence and submergence, retrogradation and progradation.

The following tabular classification of coasts has been found useful by the writer in making a preliminary diagnosis of the coastal types represented.

TABULAR CLASSIFICATION OF COASTS



* G. K. Gilbert: *Glaciers and Glaciation* (Vol. 3 of Harriman Alaska Expedition), New York, 1904; reference on pp. 210-218.

NEW ZEALAND COAST TYPES

Almost every conceivable type of coast has its representative somewhere in New Zealand's long coast line; but the principal types are as follows:

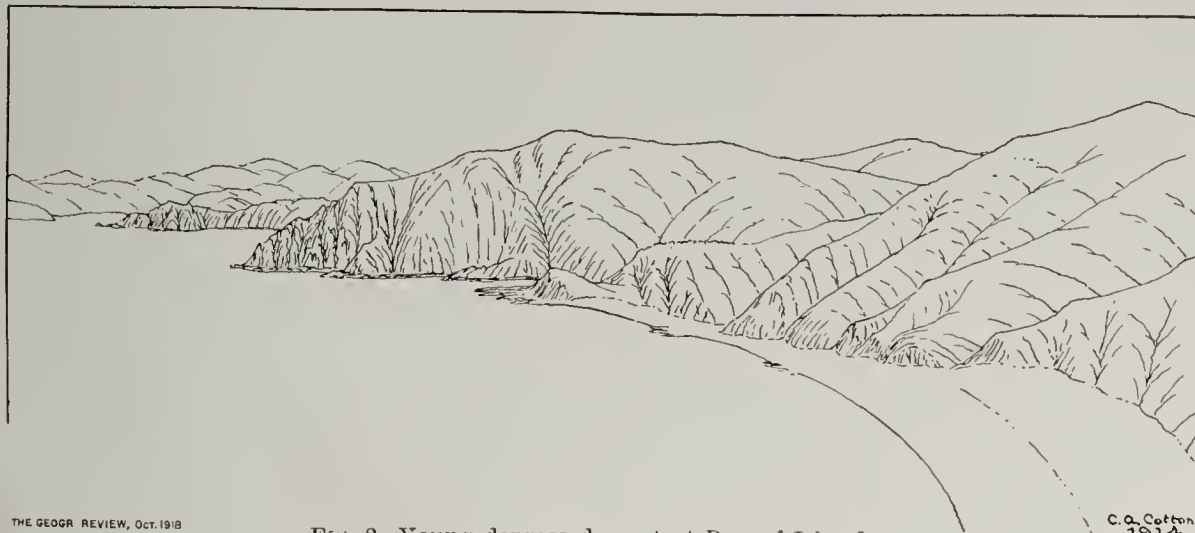
- (1) Drowned coasts, the presubmergence form being generally indecipherable, but, from analogy, probably of the fault-coast type, II B, III B (1, 2).
- (2) Drowned volcanic coasts, I A (1, 2).
- (3) Fault coasts, all or nearly all subsequently uplifted and, therefore, multicycle fault coasts, III, III A (1, 2).
- (4) Prograded coasts, 2 (a, b).

¹⁷ See Map of Earthquake Origins, by G. Hogben, in Patrick Marshall: *The Geography of New Zealand*, Christchurch, 1905(?), Fig. 10, p. 219.

The Coasts of the North Island

NORTHERN PART

The northern half of the North Island has been affected by broad regional subsidence. The evidence of land forms, however, shows that this



THE GEOGR. REVIEW, OCT. 1918

FIG. 2—Young depressed coast at Bay of Islands.

subsidence is not of great amount and that it followed still greater uplift. It would appear from the depth of water not far from the coasts that this subsidence affected a land mass roughed out previously to a shape very



FIG. 3—At Bay of Islands, northern New Zealand.

similar to that of the present land. A long period of erosion followed the roughing out of the initial coast, and so the subsidence has given a typically drowned shore line, which is now, especially on the eastern coast, still in a young stage of development (Figs. 2-6).

On the western coast, upon which great seas are continually breaking, a long, straight shore line has been developed, in part by the cutting back of headlands but principally by progradation, enormous quantities of sand having been thrown up as beaches, spits, and bars and piled as dunes upon

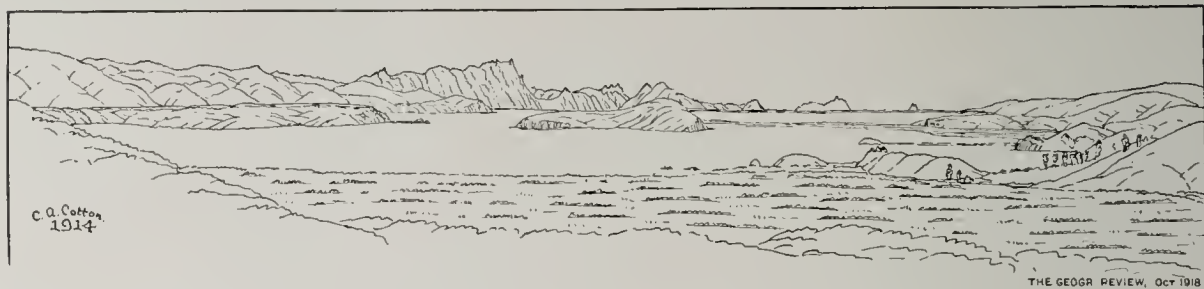


FIG. 4—Whangarei Harbor, northern New Zealand.

the foreland. This even coast is broken here and there by inlets which are the openings of drowned valley systems extending far inland. Progradation and dune formation along this coast have not been confined to the



FIG. 5—Whangaroa Harbor, northern New Zealand. (Photo from New Zealand Dept. of Tourist and Health Resorts.)

present cycle of coastal evolution, for there is a strip of soft sandstone of eolian origin with pronounced cross-bedding which must have accumulated on an advancing shore line in the period anterior to the recent submergence of the valleys that cross it and anterior also to the earlier uplift

that led to the excavation of those valleys and the mature dissection of the eolian sandstone.

This type of coast extends southward along the west coast almost to the great salient of Taranaki; while on the east coast the drowned coast reaches to Poverty Bay.



FIG. 6—The upper reaches of Auckland Harbor.

SOUTHERN PART

In the southern part of the North Island shore lines resulting from recent subsidence are not found except locally at Wellington; and, as in the north, the land forms afford evidence of a series of movements of uplift.¹⁸ It is not clear whether the whole of this intermittent uplift is to be correlated with the uplifts which preceded the valley-drowning subsidence in the north. Possibly the later stages of the uplift in the south took place contemporaneously with the northern subsidence, in which case the latest and most important movement in connection with the origin of the existing coasts might be regarded as a tilting of the whole island on a hinge line about midway between the extremities. This has not, however, been established, and the effects have probably been produced by movements of a less simple character.

The eastern and southern coasts may be classed as multicycle fault coasts (Figs. 7 and 8), but the latter is interrupted by a locally down-warped and embayed area occupied by Port Nicholson, the harbor of Wellington (Fig. 11).¹⁹ That of western Wellington appears to be a mature fault coast also, but differs from the others in being prograded except at the southern end (Fig. 9). A number of features in connection with the coastal lowland bordering this coast point to alternation on a large scale between progradation and retrogradation in the period that has elapsed since the last significant movement of uplift.

The first decipherable stage in the history of the development of this western coast is a phase of retrogradation during which a mature line of

¹⁸ C. A. Cotton: Notes on Wellington Physiography, *Trans. and Proc. New Zealand Inst.*, Vol. 44, 1911 pp. 245-265.

¹⁹ C. A. Cotton, papers cited in footnotes 1 and 18.

cliffs was developed on the old rocks forming the core of the land. Except at the southern end of the coast, however, a foreland compounded of several elements (Fig. 10) and varying in width up to about twelve miles, now lies in front of the ancient cliffs. The material composing the foreland is of two kinds, gravel of local origin and sand which has been transported alongshore from the north. The abundance of the latter at certain times seems to have been the cause of progradation, and reversals of the process seem to have resulted from fluctuation in the supply. The sand thrown up by the sea in the first progradational phase formed, apparently,



FIG. 7.—Cliffs of the southern coast of Wellington. Note the talus that has accumulated along the base of the cliffs since the small uplift of 1855.

a dune-covered foreland, while the gravel supplied by local streams would accumulate on the foreland as fans. When the foreland grew wide, the irregular surface seems to have been planed or reduced to an even seaward slope by subaërial erosion, the sand, no doubt, first becoming fixed by vegetation, as is the case on modern dunes along this coast. Then came a phase of retrogradation. At its narrow southern end the foreland was at this time cut away practically altogether, and farther north the seaward margin of the planed dunes was cut back to such an extent that revived streams dissected the sloping surface. A second extensive progradation has built a new dune-covered foreland several miles in width, between which and the margin of the older foreland (and especially in the valleys of the latter) there are some lakes and swamps, while in places the newer dunes, now fixed by vegetation, interfinger with the spurs of the older foreland. The existing gravel fans have been built in the later main progradational phase.

At the narrow southern end of the foreland, where the intermediate phase of strong retrogradation has only recently been terminated by the southward growth of the newer foreland along the coast, there are strongly marked features illustrating the four main phases in the oscillation of the shore line. The cliffs of the first retrogradational phase are now somewhat subdued and rounded by soil creep, and pass by a smooth concave curve at the base into the talus slopes and fans of the next phase—the first progradation (Fig. 13, fans on left). These fans are irregularly truncated by the cliffs developed in the second retrogradational phase, which, in



FIG. 8—An uplifted platform of the multicycle fault coast of southern Wellington.

places, are cut back far enough to intersect the line of the older cliffs (Fig. 13, center). In front of the newer line of cliffs lies the modern foreland, consisting of a belt of dunes, which are fixed on the landward side by vegetation and which enclose between them and the cliffs a narrow strip of marshy plain.

The Coasts of the South Island

NORTHERN COAST

Golden Bay and Tasman Bay, which are deep re-entrants in the northern coast, appear to be areas of subsidence connected with the Cook Strait depression. Along their shores there is evidence of uplift and also of some subsidence, the latter movement being the more recent. Thus the coast is more or less drowned, and still young, though straightened to some extent by the growth of sand and gravel spits and to a smaller extent by cliffing.



FIG. 9.—The shore of Cook Strait, southwestern coast of Wellington.

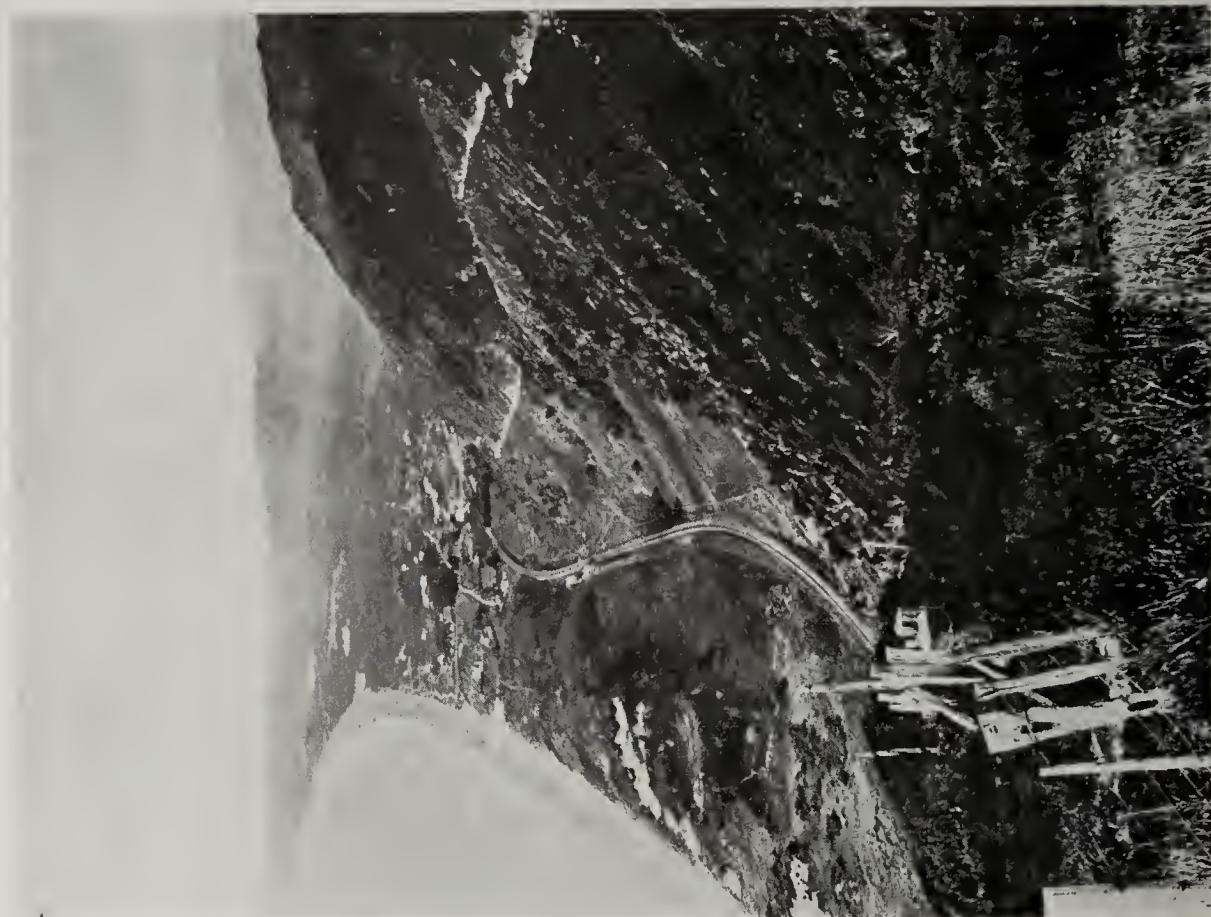


FIG. 10.—Extreme southern end of the foreland of western Wellington, backed by the cliffs of Paekakariki.

At the head of Tasman Bay confluent deltas of several rivers form extensive plains, while, near the head of the bay on its eastern side, an interesting feature is Nelson Haven, a sheltered harbor enclosed by a spit of coarse gravel and boulders up to the size of a man's head and even larger. This spit extends for eight miles along the shore southwestward from a high, cliffed bluff from which the rock material is derived and encloses a strip of water one to two miles in width (Fig. 12). The natural entrance to the harbor around the hooked southern end of the spit is shallow and rocky, but an opening has recently been cut artificially through



FIG. 11—Young depressed coast of the Port Nicholson (Wellington Harbor) area of local subsidence.

the natural breakwater. Considered as a spit the "Boulder Bank," as it is called, is of interest on account of the coarseness of the material of which it is built.

The drowning of the coast is very pronounced on the east side of Tasman Bay in the area known as the Marlborough Sounds, where rias penetrate far inland among mountains 2,000 to 4,000 feet in height (Fig. 14).

To the southeast there is then an abrupt transition to an uplifted district (eastern Marlborough) separated from the Sounds district only by the delta of the Wairau River (which is built into Cloudy Bay, a branch of the Cook Strait depression). The eastern Marlborough coast has been ascribed by the writer to the multicyle fault-coast type.²⁰

EASTERN COAST

Farther southward along the eastern coast of the South Island the features characteristic of very recent uplift fail and are replaced by others

²⁰ C. A. Cotton, paper cited in footnote 1, pp. 33-41.



FIG. 12—The Nelson Boulder Bank.

indicating subsidence, particularly at Banks Peninsula. The same subsidence is known to have affected the adjacent parts of Canterbury, but the coastal features characteristic of subsidence are limited to Banks Peninsula, as the adjacent coasts are strongly prograded. Banks Peninsula (Figs. 15 and 16) forms a very prominent salient beyond the seaward margin of the Canterbury Plain. Originating as an island formed by a cluster of volcanoes that has been dissected and depressed, it is now tied to the shore line of the plain by the growth of bars of gravel from the south



FIG. 13—Fans at Paekakariki, western Wellington, built in front of an ancient coast and afterwards cut back by the sea. In front of the newer line of cliffs lies a strand plain.

and of sand from the north, the great lagoon enclosed between which has been partly filled, with the formation of a large area of low-lying land.²¹

BANKS PENINSULA

The two largest of the drowned valleys of Banks Peninsula are the harbors of Lyttelton and Akaroa (Fig. 17). They penetrate into the hearts of the two main volcanoes of the complex and are enlarged to great basin-like hollows owing to the monoclinical retreat of the inward-facing escarpments of the lava sheets. Speight,²² therefore, retains for them the term *calderas*, applied by Von Haast.

CANTERBURY PLAIN COAST

The Canterbury Plain is made up of confluent gravel deltas,²³ and its shore line has advanced seaward owing to accumulation being more rapid

²¹ Julius von Haast: *Geology of the Provinces of Canterbury and Westland, New Zealand*, Christchurch, 1879, pp. 400-401.

²² R. Speight: *The Geology of Banks Peninsula, Trans. and Proc. New Zealand Inst.*, Vol. 49, 1917, pp. 365-392.

²³ Julius von Haast, *op. cit.*, p. 396.

than subsidence. Southwards of Banks Peninsula the plain is fringed by the Ninety Mile Beach, the northern end of which forms the isthmus that ties the peninsula to the plain on the southern side. Abundant gravel brought down from the Southern Alps by the rivers that cross the Canterbury Plain travels northward along the shore line and causes progradation in an increasing degree towards the peninsula, which arrests further movement of the gravel. One after another the drowned valleys on the south side of the peninsula are being cut off from the ocean by gravel bars. Lake



FIG. 14—In Queen Charlotte Sound, Marlborough Sounds district.

Forsyth, the largest of these and the last to be closed, is said to have been sufficiently open to be useful as a boat harbor in the early part of the nineteenth century, though now closed and converted into a brackish lake²⁴ (Fig. 16).

TIMARU

The northward drift of gravel along the shore line is still prominent at the southern end of the Canterbury Plain, much gravel being brought down by the Waitaki River farther south. The gravel drift is made manifest at Timaru owing to the obstruction caused by the harbor works. When the construction of an artificial harbor at Timaru was first contemplated it was proposed to have it some distance out from shore in order to allow the gravel to travel past along the beach. This scheme was not adopted, however, and a harbor was enclosed between two curved breakwaters extending out from the shore. In a few years the obstruction thus formed had caused a broad prograded strip to grow on the southern side, the har-

²⁴ R. Speight, *op. cit.*, p. 370.

bor was rapidly being filled up, and it was found necessary to run a new wall straight out seaward as a "shingle trap." In the future, further extension of this wall will probably be required. One curious result of the



FIG. 15—The northern side of Banks Peninsula. The entrance to the harbor of Lyttelton lies beyond the first headland.

stoppage of the movement of gravel along the shore is that the beach immediately under the lee of the harbor works, known as Caroline Bay,

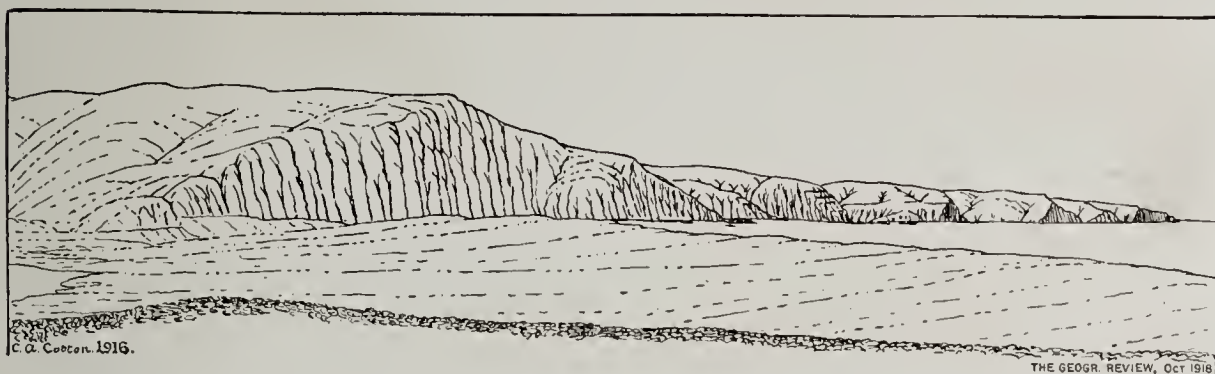


FIG. 16—The southern side of Banks Peninsula, from a gravel ridge on the Ninety Mile Beach. The recently closed bay, Lake Forsyth, is on the left.

which was formerly part of the gravel beach, is now covered with sand, being the only sandy beach for many miles. The possession of this beach has converted Timaru into a summer resort.

OAMARU AND OTAGO

Southward of Timaru the delta of the Waitaki repeats the features of the Canterbury Plain coast, while beyond it, at Oamaru, a mature cliffed coast begins, cut on weak rocks with moderate relief and fringed by a narrow strip of coastal plain, now cut back to cliffs some forty feet in height. The accumulation of the young littoral sediments of this strip marks a period of downward oscillation preceding the small uplift which was the last movement and which laid bare the narrow coastal plain and initiated the retrogradation that has reduced it to a discontinuous terrace.²⁵

²⁵ This is the "42 ft. raised beach" of Park (J. Park: *The Geology of the Oamaru District*, North Otago, *New Zealand Geol. Survey Bull. No. 20* (N. S.), Wellington, 1918, pp. 19 and 112). The so-called "12 ft. raised beach" is the platform and bed of gravel at the base of the young coastal plain sediments.

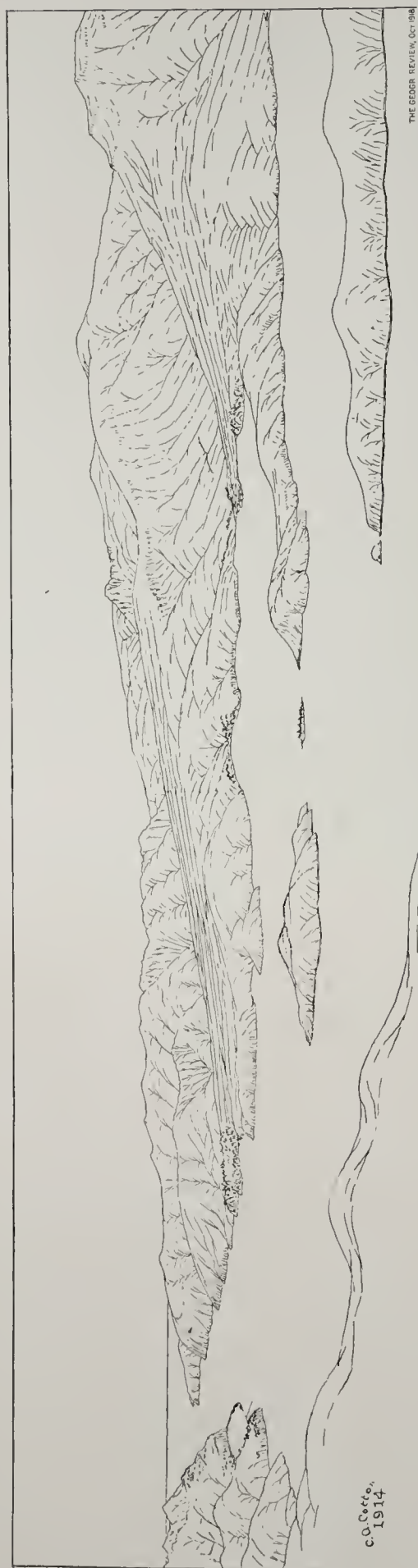


FIG. 17—Port Lyttelton, Banks Peninsula.

Farther south a young drowned coast is again prominent, the maximum of embayment being found on the volcanic massif of Otago Peninsula. Here is a great quantity of sand traveling northward along the shore, which has more or less completely closed the inlets (Fig. 18), Otago harbor being the only one that is navigable. Otago harbor results from the drowning of two valleys and the divide between them, but one entrance to the strait thus formed is now closed by a sand isthmus connecting Otago Peninsula with the mainland.²⁶ Upon the isthmus part of the city of Dunedin is built.

FOVEAUX STRAIT AND STEWART ISLAND

The coast line for some distance southwestward from Otago Peninsula is practically mature, but as Foveaux Strait is approached embayments again appear, probably partly as a result of the slower rate of erosion in more sheltered waters. Stewart Island, as well as the opposite mainland shore, is deeply embayed, and Foveaux Strait, which lies between, may be due entirely to general subsidence, though it is quite possible that a strait had been formed by local subsidence, as Hochstetter supposed,²⁷ prior to the general subsidence. The deep indentations of the eastern side of Stewart Island form fine harbors, but the exposed, western coast has been much straightened by the cutting back of headlands and the filling of bays with sand.

WESTERN COAST

The western coast of the South Island has been shown to be at least in its

²⁶ Patrick Marshall: *The Geology of Dunedin* (New Zealand), *Quart. Journ. Geol. Soc.*, Vol. 62, 1906, pp. 381-424; reference on p. 384.

²⁷ F. von Hochstetter, work cited in footnote 5.

northern part one of those rather recently uplifted and subsequently cut back by erosion.²⁸



FIG. 18—Embayments closed by sand bars, Otago Peninsula.

This coast bounds a group of high faulted blocks, and its original outline was probably determined by a fault line. The present maturity of



FIG. 19—View looking up Milford Sound, the finest of the New Zealand fiords. Stirling Fall (500 ft.) spouts from the mouth of a hanging valley on the extreme left, and the sheer precipice beside it is 3,000 feet high.

outline and high, bold cliffs of the west coast are to be largely ascribed to

²⁸ J. A. Bartrum: The Geological History of the Westport-Charleston High-level Terraces, *Trans. and Proc. New Zealand Inst.*, Vol. 46, 1913, pp. 255-262.

the enormous energy of the waves driven before the westerly winds of the "roaring forties." The supply of waste from the mountains is so great, however, that parts of the coast are prograded in spite of the great energy of wave action. Recent inroads made by the sea on the town of Hokitika, which is built on a strand plain, point to alternation between periods of progradation and retrogradation similar to those noted on other sections of the New Zealand coasts.

THE FIORD DISTRICT

In the southwestern, or fiord, district the deep offshore soundings and the sweeping curve of the shore line seem to indicate without doubt a fault origin for the outer coast. This is suggested in a map by Park.²⁹ The occurrence of high benches which appear to be eut platforms suggests a multicycle origin. Much has been written about the fiords or "sounds" of this section of the coast,³⁰ which resemble the fiords of Norway, and it is not proposed to discuss them at length here. The existing features of the fiords are clearly of glacial origin. What remains in doubt is the origin of the preglacial valleys, whether these were insequent, fault-guided, or tectonic. It may be noted that the generalization emphasized by Gregory in a recent publication,³¹ that the most typical fiords are straits parallel with the coast, does not hold for New Zealand, where there are no longitudinal fiord straits, unless the inland "fiord" Lake Te Anau be regarded as taking the place of these.

²⁹ J. Park, work cited in footnote 12, p. 265.

³⁰ See especially J. W. Gregory: *The Nature and Origin of Fiords*, London, 1913, pp. 350-368.

³¹ J. W. Gregory: *Fiords and Earth Movements*, *Scientia*, Vol. 20, 1916, pp. 253-264.

THE SLAVS OF SOUTHERN HUNGARY*

By B. C. WALLIS

[With three separate maps, Pls. XIV-XVI, facing p. 352.]

The Slavs of southern Hungary include those Hungarians who belong to the group of Yugo-Slavs (Southern Slavs). They live in Croatia-Slavonia and four counties of Hungary proper (see Fig. 2). Croatia-Slavonia consists of, first, the lower and Hungarian portion of the mesopotamian land between the Save and the Drave, the great Danubian tributaries which flow from the Eastern Alps, and, secondly, that portion of the Dinaric Alpine region which fringes the hundred-mile strip of the Hungarian coast on the Adriatic Sea. The four counties of Hungary proper are grouped here under the title of South-Slav Hungary; they are Baranya, west of the Danube and north of the Drave; Bács-Bodrog (the Bácska), between the Danube and the Tisza; and the two counties of Torontál and Temes, which form the western Banat.

THE YUGO-SLAVS

The Yugo-Slavs—other than their eastern division, the Bulgarians—include three peoples, the Slovenes (most of whom live in Austria), the Croats, and the Serbs. The Croats are distinguished from the Serbs by two characteristics—they are Roman Catholics and use the Roman alphabet, while the Serbs are members of the Eastern Church and use Cyrillic characters. In the early censuses the only official method of separating Serbs from Croats was based upon their religion; one of the many refinements of the later censuses is to separate them on the basis of mother tongue and to distinguish the Sokáczes and Bunyeváczes of South-Slav Hungary separately from the Serbs, mainly on the ground that they are Roman Catholics. For purposes of historical comparison it is necessary to group the Serbs and Croats together as Serbo-Croats. The Roman Catholic Serbs live in Baranya and the Bácska. It is not clear how the Serb is distinguished from the Croat on the basis of speech, as both peoples use the same language.

POPULATION AND AREA

The total population of Yugo-Slav Hungary in an area of 30,000 square miles amounts to 5,000,000, as many people as there are in Rumanian Hungary, as defined in the first article, in an area of 38,000 square miles. The density of population is the same as the average density of the popula-

*This is the third of a series of four articles. The first two, "The Rumanians in Hungary" and "The Slavs of Northern Hungary," appeared in the August and September numbers of the *Review*. The last, "Central Hungary: Magyars and Germans," will appear in the November number. An explanatory note on the maps accompanies the first article.—EDIT. NOTE.

tion in Hungary as a whole (see Table I in the first article, p. 157). In area the country of the Yugo-Slavs is therefore equal to South Carolina and in population to Ohio.

South-Slav Hungary contains eight municipalities, of which the largest, Szabadka (with 95,000 people and 244,000 acres), is the third largest town in Hungary (cf. Duluth, with 94,000 people and 55,000 acres). The other municipalities, in order, are: Temesvár (with 73,000 people and 21,000 acres; cf. Harrisburg, Pa., with 72,000 people and 3,000 acres), Pécs (50,000), Újvidék (34,000), Zombor (31,000), Versecz (27,000), Baja (21,000), and Pancsova (20,000). Croatia-Slavonia contains four municipalities: Zágráb, the capital (with 79,000 people and 17,000 acres; cf. Manchester, N. H., with 78,000 people and 20,000 acres), Eszék (31,000), Zimony (17,000), and Varasd (13,000). The port of Fiume, though geographically part of Croatia-Slavonia, is administered as a separate portion of Hungary proper; it contains 50,000 people in an area of 5,000 acres. Nearly half the inhabitants are Italians, one-eighth are Magyars, and a quarter are Croats. The surrounding district is peopled by Croats (cf. Pl. XV).

THE PEOPLE OF SOUTHERN HUNGARY

The 5,000,000 inhabitants are almost equally divided between Croatia-Slavonia and South-Slav Hungary. During the decade 1900-1910 the natural increase of the population in South-Slav Hungary was two-thirds that of Croatia-Slavonia, while the emigration from the Hungarian area was at a slightly faster rate than that from the mesopotamian land. Both areas received a small inflow of people from other parts of the kingdom. In comparison with Rumanian Hungary, Croatia-Slavonia had a greater natural increase, while South-Slav Hungary had a smaller natural increase, than either of the Rumanian areas. The emigration from both the Yugo-Slav districts exceeds that from the Rumanian Forelands, and that from Croatia-Slavonia was at an equal rate with the emigration from Transylvania.

TABLE I—POPULATION CHANGES IN SOUTHERN HUNGARY, 1900-1910
(Population in thousands)

	TOTAL POPULATION		NET INCREASE (b)-(a)	EXCESS OF BIRTHS OVER DEATHS	CHANGE (e)-(d)	ESTIMATED NET EMIGRATION	MIGRATION WITHIN AUSTRIA-HUNGARY
	1900	1910					
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
<i>South-Slav Hungary</i>							
Thousands.....	2,187	2,281	94	197	-103	-119	16
Per cent.....	....	....	4.2	8.9	4.7	5.5	0.8
<i>Croatia-Slavonia</i>							
Thousands.....	2,455	2,672	217	328	-111	-112	1
Per cent.....	....	....	8.5	12.8	4.3	4.3	...

In comparison with the Northern Slavs the natural increase of the Southern Slavs is small; the purely Slav country of Croatia-Slavonia had a lower rate than Ruthenia or Ruthenian Slovachia, while South-Slav Hungary, an area of several peoples, had a smaller increase from natural causes than Slovachia. Emigration from the south did not attain the magnitude of that from the north, although the southern population is 25 per cent more numerous; the chief cause of the difference was the exceptional emigration from Ruthenian Slovachia. The internal migrations were also smaller than those of the north. It may, therefore, be concluded that Croatia-Slavonia was in a fairly settled state, like Ruthenia and Transylvania, while South-Slav Hungary tended rather towards the unsettled condition which characterizes the Slovak lands.

The percentage increase in population between 1880 and 1910 confirms this conclusion (Table II). The 40 per cent increase for Croatia-Slavonia lies between the increases for the Transylvania (28 per cent) and Ruthenian districts (54 per cent), and the 22 per cent increase for South-Slav Hungary is equivalent to that for Slovachia.

The people of Yugo-Slavia are Serbo-Croats, Magyars, and Germans, with a small number of Jews. In South-Slav Hungary the Magyars have increased steadily since 1880 and now form a relative majority of the population; the Germans were slightly more numerous in 1910 than in 1880 but suffered absolute losses in numbers during the last two decades; the Serbo-Croats were less numerous in 1910 than in 1880 (Fig. 1).

TABLE II—NATIONALITIES IN SOUTHERN HUNGARY, 1880 AND 1910

NATIONALITY	SOUTH-SLAV HUNGARY			CROATIA-SLAVONIA		
	1880	1910	INCREASE PER CENT	1880	1910	INCREASE PER CENT
Thousands.....	1,859	2,281	22	1,913	2,672	40
Density per square mile.	90	111	...	72	100	...
SERBO-CROATS						
Thousands.....	454	444	-2	1,716	2,288	33
Percentage.....	24	19	...	89	85	...
MAGYARS						
Thousands.....	489	736	50	40	107	168
Percentage.....	26	32	...	2	4	...
GERMANS						
Thousands.....	562	627	11	76	128	68
Percentage.....	30	28	...	4	5	...
JEWS						
Thousands.....	39	43	10	13	22	69
Percentage.....	2	2	...	1	1	...

The curve for the Serbo-Croats in South-Slav Hungary (Fig. 1) is in striking contrast with the corresponding curve in Croatia-Slavonia and resembles the curve for the Germans between the years 1890 and 1910. Consequent upon these losses of Serbo-Croats and Germans the rate of increase of population in South-Slav Hungary fell away notably from decade to decade; a similar decline is indicated by the curves for the Slovak districts (Fig. 1, p. 271).

In Croatia-Slavonia five people out of six are Serbo-Croats; their numbers have steadily increased, although the rate of increase was slower than those of the small minorities of Magyars, Germans, and Jews.

SERBO-CROATS IN GENERAL

As in the case of the Rumanians and the Ruthenians of Hungary with regard to the total number of their respective nationalities, the Serbo-

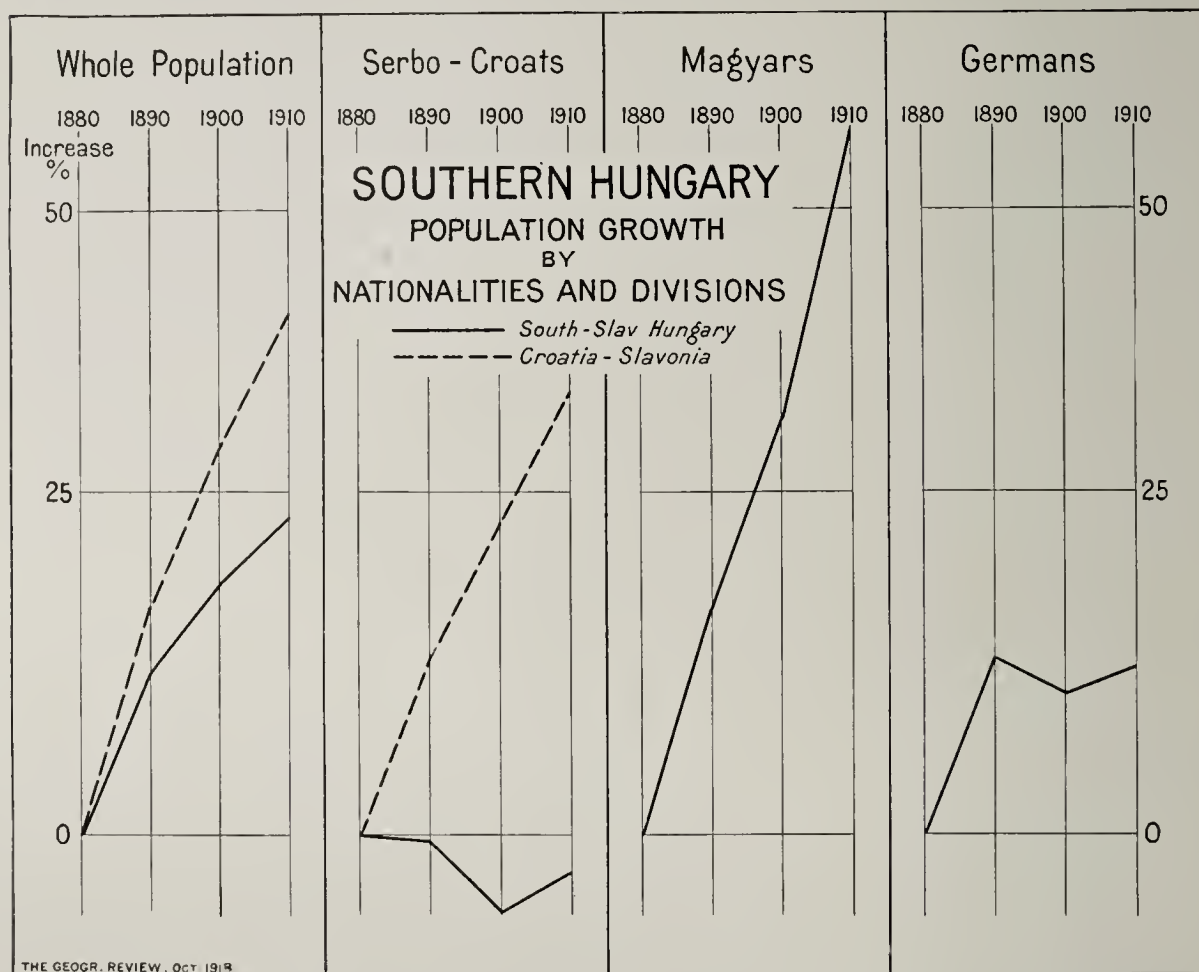


FIG. 1.—Diagram showing, by nationalities and divisions, the population growth in southern Hungary from 1880 to 1910.

Croats of Hungary, 2,281,000 in number, are a minority of the total Yugo-Slav population of Central Europe. There are Slovenes and Serbo-Croats in Austria, so that Trieste like Fiume is an island on the edge of a Yugo-Slav sea. There are Serbo-Croats everywhere south of the Save both in Bosnia and Serbia. The total number of Yugo-Slavs may be estimated at 10,000,000, which number brings this people to the level of the Czecho-Slovak group of Northern Slavs and to half the magnitude of the Ruthenians, or Little Russians. Geographically the linguistic boundary of the Serbo-Croats is well defined on the northwest but is indeterminate on the northeast. Near the Austrian border the boundary lies along the Mur and the Drave; in fact, along this portion of the Drave occurs the most definite

linguistic boundary in Hungary. Passing eastward along the river, the moment the German element appears among the population the linguistic boundary leaves the river and becomes ill-defined. It runs across Baranya towards the confluence of the Maros with the Tisza and separates the Yugo-Slavs from the Magyars; farther east the line turns southwards across the Banat and separates the Slavs from the Rumanians.

There arises, however, one fact of considerable importance. The whole of the Save, the country along the right bank of the lower Drave, and the Danube for a large portion of its course eastward lie within Yugo-Slavia. This territory abuts on the Rumanian lands to the east, and the Slav populations on both sides of the Danube cut off a large portion of that river from the Magyar people and at the same time separate the navigation of the Magyar portion of the Danube from the navigation of the Magyar portion of the Tisza. This fact alone gives a considerable economic and political value to the solution of the problem of the future of the South Slavs and naturally gives greater prominence to that problem than to the problems of the Rumanians and the Slovaks. It must be noted, further, that the lands of the South Slavs are, on the whole, productive cultivable lowlands. South-Slav Hungary contains in the Bácska and western Banat the southern portion of the Alföld, with all its latent agricultural possibilities, for its present comparatively high state of cultivation is but an index to what the land might yield under different conditions in the future.¹ Here, again, is a factor which adds to the importance of the problem of the South Slavs.

Finally, it must be noted that Croatia-Slavonia is the one district in the Hungarian kingdom which is supposed to have an autonomous constitution. The country is under the rule of the Ban and has its own parliament, which sends representatives to the Hungarian parliament at Budapest. These are, however, limited in their voting to questions which affect Croatia-Slavonia. Like many other Hungarian institutions this arrangement is theoretically admirable, but in practice it suffers from the fact that the official in Hungary must be a Magyar. The Ban is removable at will by the Hungarian premier, and the parliamentary elections are conducted orally by a Magyar official, so that it is always possible to secure a Magyarist majority in the Croatian parliament. It is stated that for some months prior to the outbreak of war the whole of southern Hungary was under martial law.

NATURAL INCREASE OF THE POPULATION

The birth rate in southern Hungary is, in general, high; the Serbs are the most prolific, their birth rate being equal to that of the Ruthenians. The Croats have proportionately as many births as the Slovaks. Both

¹ Cf. the article by the author: *The Peoples of Hungary: Their Work on the Land*, *Geogr. Rev.*, Vol. 4, 1917, pp. 465-481.

peoples have a higher birth rate than the Rumanians. The death rate of the Serbs is the highest in Hungary; the Croat death rate is approximately on a level with those of the Rumanians and the Slovaks. Consequently the natural increase of the Croats exceeds that of the Serbs and is as high as that of the Slovaks in Ruthenian Slovachia. The rates of natural increase

TABLE III—VITAL STATISTICS, 1900-1910

NATIONALITY	RATES PER 10,000 PER ANNUM			INFANT MORTALITY, PER CENT OF LIVING BIRTHS	ILLEGITIMATE BIRTHS, PER CENT OF TOTAL BIRTHS
	BIRTH	DEATH	NATURAL INCREASE		
South-Slav Hungary					
Magyars.....	373	264	109	22	8
Germans.....	378	228	150	23	8
Serbs	413	326	87	27	15
Croatia-Slavonia					
Croats.....	392	244	148	17	4
Serbs	463	330	133	22	8

of Magyars and Germans in South-Slav Hungary are very different from the corresponding rates in the Rumanian Forelands; the Germans in Baranya and the Bácska have a greater natural increase than the Germans in any other part of Hungary, while the Magyar rate in the same area is almost as low as the Magyar rate in Transylvania.

The rate of infant mortality in Croatia-Slavonia resembles those in Ruthenia and the Rumanian Forelands, but the rates in South-Slav Hungary are the highest in the kingdom. The Serb rate is excessive; one child out of four who are born alive dies before it attains its first birthday. The rate among the Germans indicates the effect of the birth rate (which is high for Germans) and confirms the difference already noted between the Swabians in South-Slav Hungary and the Saxons of Transylvania. The Serb proportion of illegitimate births is exceeded in Hungary only among the Magyars of the Rumanian Forelands; the Roman Catholic Croats, like the Roman Catholic Slovaks, have a small proportion of illegitimate children.

As was the case among the Northern Slavs the curves of change of population (Fig. 1) indicate chiefly the results of migratory movements of the people, for the least prolific race shows a steady and continuous increase in numbers. This is the case even in Croatia-Slavonia, since the curve for Serbo-Croats is less steep than the curve for total population, although the Serbo-Croats are on the whole increasing most rapidly from natural causes.

MIGRATORY MOVEMENTS

Emigration from South-Slav Hungary was about 60 per cent of the natural increase of the population. More than half of the emigrants were Germans, although the Germans number less than one-third of the population. The Serbs and Magyars each provided approximately one-tenth

of the emigrant stream, where the Serbs form a fifth and the Magyars nearly a third of the population. The Germans, therefore, are losing ground in South-Slav Hungary like the Slovaks in Ruthenian Slovachia. In Croatia-Slavonia the Germans provided 7 per cent of the emigrants from 5 per cent of the people. The total emigration from this area was about a third of the natural increase, and the Serbo-Croats provided a proportion of the emigrants equivalent to the strength of their element in the population.

TABLE IV—ESTIMATED NET EMIGRATION, 1900-1910
(Percentages of total)

	(A) NATIONALITIES			
	MAGYARS	GERMANS	CROATS	SERBS
From:				
South-Slav Hungary.....	10	58	..	11
Croatia-Slavonia.....	3	7	58	28
	(B) DESTINATIONS			
	To: Germany	Balkan States	Rest of Europe	America
From:				
South-Slav Hungary.....	4	..	1	90
Croatia-Slavonia.....	2	5	6	84

More than five-sixths of the emigrants went to America, a proportion which exceeds that from the Rumanian Forelands but fails to reach the magnitude of the emigration to America from the lands of the Northern

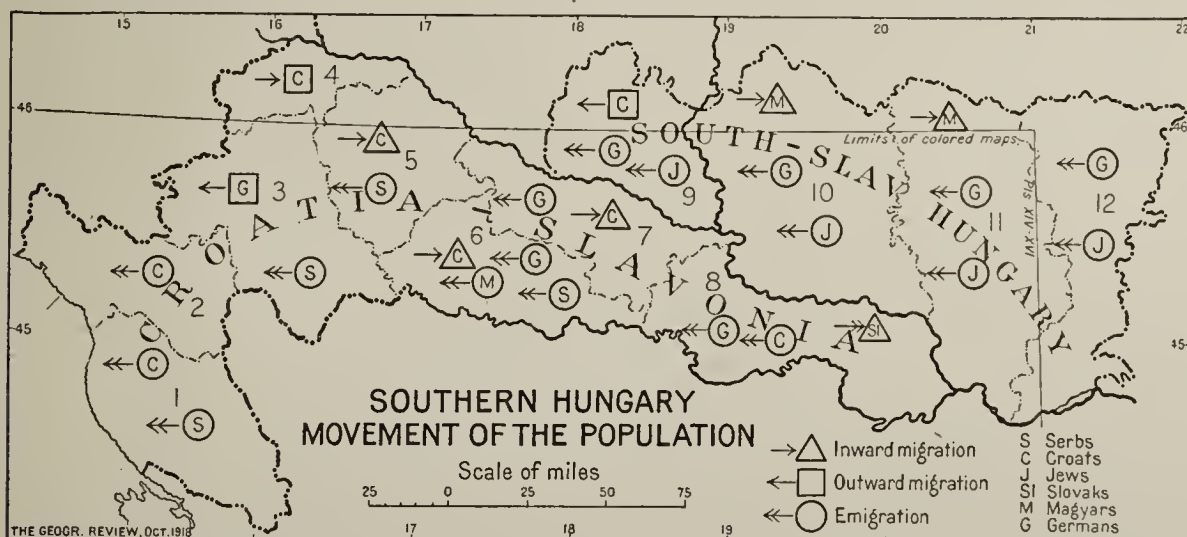


FIG. 2—Cartogram of southern Hungary showing the movement of the population. Scale, 1:5,100,000.

For the names of the counties indicated by hair-line numerals see the key below. The counties are grouped to form two large divisions for the purposes of this article, Croatia-Slavonia and South-Slav Hungary. The statistics in the tables and elsewhere in the text relating to these two divisions are based on the constituent counties as here shown.

Key to Counties: 1, Lika-Krbava; 2, Modrus-Fiume; 3, Zágráb; 4, Varasd; 5, Belovár Körös; 6, Pozsega; 7, Verőcze; 8, Szerém; 9, Baranya; 10, Bács-Bodrog; 11, Torontál; 12, Temes.

Slavs. Although Croatia-Slavonia is only separated from Serbia by rivers as a natural obstacle, while Transylvania is separated from Rumania by mountains, comparatively few emigrants left Hungary for Serbia. The proportion of emigrants to Germany lies intermediate between that from

the Northern Slav lands and that from the Rumanian lands. The net balance of internal migration amounts to a small inflow of people into each of the areas; the details of the movements are summarized in Figure 2. Two of the South-Slav counties received an inflow of Magyars, which was balanced in part by an outflow of Croatians from Baranya. Within Croatia-Slavonia the Croats tended to move eastward; there was an inflow of Slovaks into eastern Slavonia and an outflow of Croats and Germans from Croatia. The excessive emigration of Germans from South-Slav Hungary tends to account for the variations in the slope of the German curve in Figure 1.

RELIGIONS

Table V indicates the sharp religious cleavage which is practically the only distinction between the Serbs and the Croats. The Serb is a member of the Greek Orthodox Church while the Croat is a Roman Catholic; this separation implies that the Croats, with the Magyars and the Northern Slavs of Hungary as well as the majority of the people of Austria, are under the spiritual authority of the Roman Pope; it means also that the Croats and Slovenes have the same religion, while the Serbs belong to the same church as the majority of the Rumanians. The distinction is, therefore, largely geographical. The few Jews of southern Hungary are chiefly German Jews. The Germans of southern Hungary are mainly Roman Catholics while the Germans of Transylvania are nearly all Lutherans. This fact adds point to the distinction commonly current in Hungary between the southern Swabian and the eastern Saxon. The Magyars, as

TABLE V—RELIGIOUS ADHERENCE
(Percentages of total for each nationality)

NATIONALITY	ROMAN CATHOLIC	CALVINIST	LUTHERAN	GREEK ORTHODOX	JEW	OTHERS
<i>South-Slav Hungary</i>						
Magyars.....	79	18	..	1	1	1
Germans.....	71	..	17	..	11	1
Serbs.....	3	..	..	96	..	1
<i>Croatia-Slavonia</i>						
Croats.....	97	..	..	1	..	1
Serbs.....	3	..	..	94	..	3

elsewhere, are either Roman Catholics or Calvinists; the proportion of Roman Catholics is higher than that which obtains in Slovachia. It is noteworthy that in the east, where the linguistic boundary is not marked by distinct physical features, differences in religious outlook tend to outweigh the disadvantage, except where Serb marches with Rumanian in the Banat.

ELEMENTARY EDUCATION

In educational matters as in other affairs South-Slav Hungary is similar to Slovachia, and Croatia-Slavonia resembles Ruthenia and Transylvania.

In South-Slav Hungary a high proportion of the children are on the registers of the schools, two-thirds of which are Church institutions. Magyar is the language of instruction of two-thirds of the schools, while the Magyars form but half of the population; the Serbo-Croats have as many schools as they are entitled to in proportion to their numbers; but the Germans have few schools, only one in twenty-five, while they form more than a quarter of the people. The Rumanian element in the western Banat has schools in proportion to its numerical strength.

TABLE VI—ELEMENTARY EDUCATION, 1910

DIVISION	PERCENTAGE OF TOTAL NUMBER OF CHILDREN BETWEEN 6 AND 14 NOT ON THE SCHOOL REGISTERS	PERCENTAGE OF THE UN- REGISTERED WHO ARE OFFICIALLY EXCUSED FROM SCHOOL ATTENDANCE	PERCENTAGE OF THE SCHOOLS			
			(i) WHICH ARE:		(ii) WHERE THE LANGUAGE OF INSTRUCTION IS:	
			STATE OR COMMUNAL	CHURCH	MAGYAR	NON-MAGYAR
South-Slav Hungary..	8	22	32	66	67	33 *
Croatia-Slavonia.....	33	‡	92†	3	4	96 §
Magyaria.....	12	21	35	62	99	1
Hungary proper.....	12	29	25	74	78	22 ||

* 17 per cent Croat or Serb, 11 per cent Rumanian, 4 per cent German. † All communal. ‡ Not stated.

§ 96 per cent Croat or Serb. || 14 per cent Rumanian, 3 per cent German, 3 per cent Slovak.

In Croatia-Slavonia the Magyars form 4 per cent of the population and have 4 per cent of the schools; all the other schools are Serbo-Croat, so that German and Slovak children cannot receive instruction in their own tongue. One child in three escapes school attendance and nine schools out of ten are communal institutions. Croatia-Slavonia is allowed to develop its own educational system, while the Magyars receive preferential treatment educationally in South-Slav Hungary.

Table VI indicates considerable similarity in educational conditions between South-Slav Hungary and Magyaria, so that it might be expected that the standard of education was approximately the same in both areas; yet in Table IX it is shown that half the Serbs are illiterate, while only a quarter of the Magyars and a sixth of the Germans are unable to read and write. These values give roughly a quarter of the population as illiterate, which is the same proportion as obtains in Magyaria. Can it be said that the Serb is less susceptible of education than the Magyar, or is it due to the alleged indifference of the Eastern Church to education? May it not be, on the other hand, an effect of an administrative policy common to the whole of the Slav lands, both north and south? The Slovaks have been oppressed; have the Serbs experienced a like fate?

PUBLIC HEALTH

The medical service in Croatia-Slavonia is inadequate to the population. Out of six people who die in that region five are Serbo-Croats, and four of them neither receive medical treatment during illness nor is their death

certified by a physician (Table VII). In Hungary proper there is one physician on the average for 3,500 people; in Croatia-Slavonia the average is one physician for 6,800 (Table VIII). The proportion of pharmacies and midwives to population shows that the public health service in Croatia-Slavonia is less adequate than among the mountainous tracts of Ruthenia

TABLE VII—PUBLIC HEALTH, 1901-1910

NATIONALITY	PERCENTAGE OF DEATHS		CAUSES OF DEATH (PERCENTAGE)				NOT CLASSIFIED
	NOT TREATED	NOT CERTIFIED	TUBERCULOUS DISEASES	PNEUMONIA OR PLEURISY	CONGENITAL DEBILITY	SENILE DEBILITY	
	BY A PHYSICIAN						
South-Slav Hungary							
Magyars.....	56	51	15	9	8	17	21
Germans.....	41	37	12	10	11	10	23
Serbs	68	63	16	9	18	13	14
Croatia-Slavonia							
Croats	76	90	15	7	14	12	20
Serbs	90	96	15	4	20	9	24

and Transylvania. Tuberculosis appears to be more rampant than in Transylvania, and the heavy rate of infant mortality among the Serbs is connected with the high death rate from congenital debility. It might, perhaps, be suggested that since there is a certain amount of local autonomy in Croatia-Slavonia, where a considerable portion of the budget is earmarked for expenditure in the country itself, the responsibility for the defects in the medical and public health services rests upon the Serbo-Croats and not upon the Magyars; but it must be remembered that the election and other arrangements throw the whole of the machinery of administration into the hands of Magyars, who must accept responsibility for affairs in Croatia-Slavonia as elsewhere in Hungary. The Serbs in Hungary proper receive better medical treatment, since public health officers are more numerous in South-Slav Hungary than in Slovachia or the

TABLE VIII—PUBLIC HEALTH SERVICE, 1910

DIVISION	NUMBER OF PEOPLE PER:			NUMBER OF FEMALES PER MIDWIFE
	PHYSICIAN	PHARMACY	HOSPITAL BED	
South-Slav Hungary.....	4,100	6,400	625	700
Croatia-Slavonia.....	6,800	13,300	480	1,400
Hungary proper.....	3,500	8,600	490	700

Rumanian Forclands. There are, however, more deaths among them from pleurisy or pncumonia than in Croatia-Slavonia. The Magyars and Germans receive better medical service than the Slavs, this preferential treatment being a common feature in all the lands where Magyars and Germans live with one or other of the “subject races.”

ECONOMIC CONDITIONS

The Croats, like the Ruthenians and Slovaks, have a high disproportion of women to men. In Croatia-Slavonia there is a lower proportion of

adults at the working ages between 15 and 60 than in Transylvania, Ruthenia, or Slovachia. On the other hand the proportion of workers among the Serbs and Germans of South-Slav Hungary is the highest in

TABLE IX—ECONOMIC CONDITIONS
(*Rural Communities*)

NATIONALITY	NUM- BER OF WOMEN PER 1,000 MEN	AGE GROUPS (PERCENTAGE)				PERCENT- AGE OF POPULA- TION OVER 6 YEARS OF AGE ILLIT- ERATE	HOUSES (PERCENTAGE)			PEOPLE PER HOUSE	
		0-6	6-14	15-60	OVER 60		STONE OR BRICK	TIMBER	WITH THATCHED ROOFS		
South-Slav Hungary											
Magyars.....	980	17	21	53	9	27	4	4	42	4.9	
Germans.....	1,007	15	20	57	8	15	10	..	26	4.7	
Serbs.....	1,011	16	19	57	8	50	21	..	33	4.9	
Croatia-Slavonia											
Croats.....	1,110	17	22	52	9	50	36	63	39	5.5	
Serbs.....	1,035	17	23	53	7	60	16	42	20	5.9	

Hungary; it is equaled only among the Rumanians of the Rumanian Forelands.

The Croats and Serbs are more illiterate than the Slovaks but less illiterate than the Ruthenians and Rumanians. The Germans, as usual, are the most highly educated people. In relation to the effect of the churches upon education it may be noted that the order of ability to read and write is as follows: Roman Catholic Slovaks, Roman Catholic Croats, Greek Orthodox Serbs, Greek Orthodox or Uniate Rumanians, Uniate Ruthenians.

Throughout both areas the character of the house material depends upon the locality, although there is the usual difference between a trim and tidy German village and one inhabited by other people. Among the dwellers on the Alföld the houses are made of dried clay with thatched roofs; among the timbered hills of Croatia wood is more freely used. In Croatia-Slavonia the average number of people per house is higher by one than the average for South-Slav Hungary; the number is equaled only among the Magyars in northern Hungary.

RAILWAY TRANSPORTATION

In proportion to its area Croatia-Slavonia has few miles of railway, although in proportion to population the service equals the average for

TABLE X—RAILWAY TRANSPORTATION

DIVISION	MILEAGE	
	PER 100,000 INHABITANTS	PER 100 SQUARE MILES
South-Slav Hungary.....	78	14
Croatia-Slavonia.....	51	8
Magyaria.....	50	13
Hungary proper.....	71	10

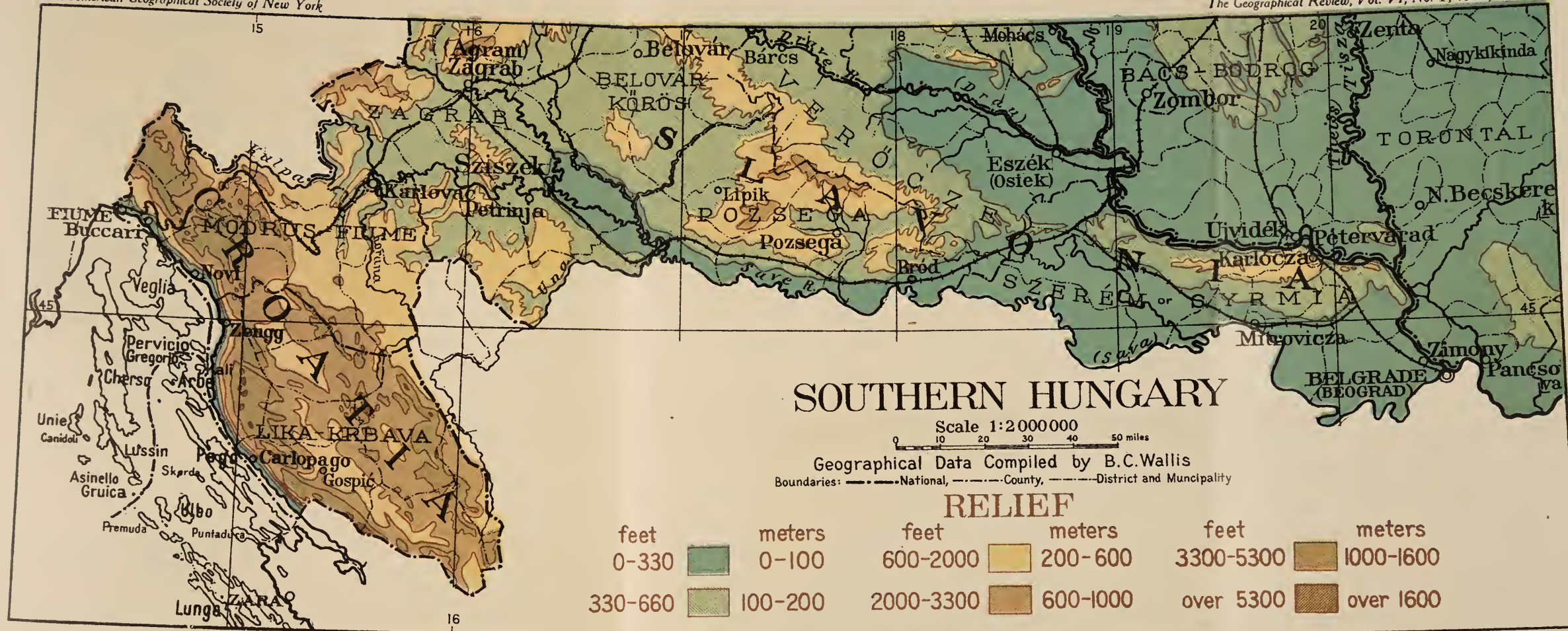
Hungary proper. South-Slav Hungary has the best railway service in the country, since it is crossed by the international route to Constantinople

from Paris, as well as by the lines for the Transylvanian plateau; yet even here the railways are not designed to serve local interests.

NORTHERN AND SOUTHERN SLAVS

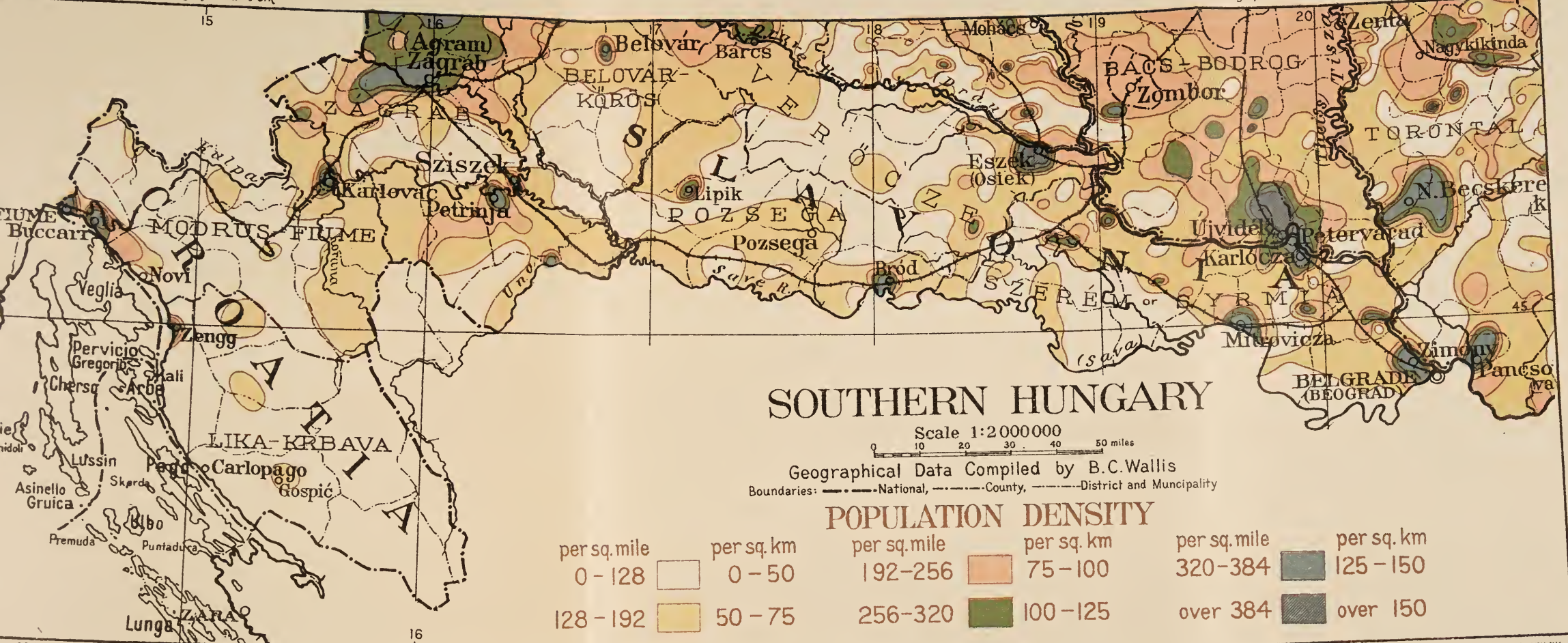
Slovaks and Serbo-Croats are peasant peoples tied by tradition and training to tillage of the ground. The Slovaks in their northern home are the people of the potato; the Serbs, with their infiltration of Mediterranean culture, are the people of the plum tree. The Slovaks are oppressed by the Magyar bureaucracy; the Serbo-Croats have a nominal measure of autonomy, based upon a local parliament (usually packed to give it a Magyarist majority) under the rule of a local governor, who is removable at will by the head of the Hungarian government. The Slovaks have neither a local parliament, nor are they represented in the Hungarian parliament by a Slovak party. The Northern Slavs are separated from the Southern Slavs by the Magyars and Germans, who occupy central Hungary. Near the western border of Hungary Croats have occupied the small mesopotamian area between the Mur and the Drave; the Slovenes in Hungary, a kindred people to the Croats, hold a small area north of the Mur, and a few Croats live in scattered islands between the Slovenes and the Danube near Pozsony. In the boundary zone between the Magyars and the Rumanians on the east of central Hungary there are islands of Slovaks, which even extend into eastern Slavonia; but neither the scattered islands of Croats on the west nor the less numerous islands of Slovaks on the east serve to provide a connecting link between the two main groups of Hungarian Slavs: the islanders must remain islanders isolated from their kinsmen or migrate from their present homes. The Slovaks can only look to the Czechs of Bohemia for leadership and assistance; they have Ruthenians on their eastern margin. Similarly it would appear that the Yugo-Slavs of southern Hungary are driven to look to Serbia for leadership and to the Western Powers, pledged as they are to the reconstitution of Serbia, for assistance; they have Rumanians on their eastern edge.

The Northern Slavs meet resistance from Germans along their western and northwestern boundaries; the Southern Slavs find considerable opposition from a section of the Italian people in reference to the Slav boundaries on the west and southwest, along the Adriatic. The Northern Slavs are adjacent to the storm center of Poland, whose historical vicissitudes have fastened public attention on their woes rather than on the troubles of the Slovaks; but the future of the Slovaks must be affected by the solution of the Polish problem, and their prosperity will, to some degree, depend upon the economic development of the Polish mines and industries. The Southern Slavs are adjacent to the storm center of the Balkans, and their continuance as a race depends upon the satisfactory outworking of plans under which the Balkan peoples can settle down harmoniously to the development of the latent possibilities of their land.









The problems of the Slovaks and the Croats, consequently, tend to be overshadowed by the apparently more insistent problems of their neighbors, whose troubles have awakened the sympathies of all civilized peoples; yet two facts must not be forgotten. First, the Northern and Southern Slavs are two horns where the Slav peoples reach farthest west; they hold two important geographical lines of communication. The Northern Slavs are the western end of that band of their race which occupies the densely peopled east-and-west route along the edge of the Northern Carpathians, penetrates the Moravian Gate, and holds the Bohemian Plateau. The Southern Slavs hold the western end of the great Danube route from the Black Sea to the Adriatic; they occupy the basin of the Save and the coast lands where the easiest routes approach the Adriatic Sea. Between these two horns the Germans are continuous from South Germany through central Austria almost to Budapest; east of the Germans lies the Magyar block. Secondly, the route from Berlin to Constantinople is crossed by both groups of Slavs; and, should Austria-Hungary persist either as an empire or as a federation, so long as Prussia dominates her politics the Prussian can claim that he has won the war, for he will have succeeded in his primary aim, the establishment of Prussian authority over Central Europe and of economic slavery to Prussia therein.

THE ACTIVITIES OF THE CANADIAN ARCTIC EXPEDITION FROM OCTOBER, 1916, TO APRIL, 1918*

By VILHJÁLMUR STEFÁNSSON

[With separate map, Pl. XVIa, facing p. 368.]

The *Polar Bear*, one of the vessels of the Northern Division of the Canadian Arctic Expedition, wintered in 1915-1916, it will be remembered, half way up Prince of Wales Straits, between Victoria and Banks Islands. It was correctly reported by Dr. Anderson, Mr. Wilkins, and other members of our expedition on their return south in 1916, that my intention was to have the *Polar Bear* return home by Melville Island and thence by the well-sailed eastern route to the St. Lawrence. As will appear later, this was never attempted.

While it had not occurred to me that the *Polar Bear* might fail to attempt coming, I fortunately realized clearly enough that one thing or another might frustrate the best-meant attempt. We should then not only have to winter in Melville Island on the native resources of that country; but, if we did not want to waste also that part of the following spring which precedes navigation, we should have to get ready to do the work of 1917 on meat only, or at least mainly. True, I knew of the large food caches left on the south coast of Melville Island by former explorers, but I was so much impressed with the danger of scurvy and with the anti-scorbutic value of fresh meat that I should have been more at ease in my mind had I not known those caches were there. In my experience men are healthy and contented when they know that all foods but meat are out of the question, but healthy and discontented if they know of other things they might be eating if they were only allowed. In order, then, to provide fresh meat against the dark period of winter and dried meat and fat for food and fuel on the ice trip of 1917, I asked Storkersen with eight Eskimos to spend the summer of 1916 in Melville Island putting up meat. It proved that they dried for sled rations the meat of over ninety muskoxen and thirty seals, with several bears and a few reindeer; in the

* The following account was sent to the *Geographical Review* by Stefánsson from St. Stephen's Hospital, Fort Yukon, Alaska, under date of June 17, 1918. It was written by the author as a continuation of the narrative of his activities published in the *March Review* (Vol. 5, 1918, pp. 238-241), which he had just read, and carries the record from October, 1916, to the spring of 1918, when he was rapidly convalescing from the attack of typhoid with which he had been stricken in the Mackenzie delta the January before. The important advance into the polar sea from the first newly discovered island, briefly mentioned in the *Review* note on the basis of the meager newspaper accounts of the time, is, among other matters, here dealt with fully. Because of his illness the author was unable to bring with him any of the expedition records; he, therefore, wishes to state that dates and geographical positions cannot be relied on to be more than approximately correct.

The map which accompanied the note in the *March Review* is republished with the present article (Pl. XVIa), revised and amplified to bring it up to date.—EDIT. NOTE.

latter part of summer they killed for clothes and meat over sixty reindeer and about half a hundred additional muskoxen. More could easily have been killed, but this was considered enough.

WINTER QUARTERS ON MELVILLE ISLAND

During the winter of 1916-1917 we maintained two camps on Melville Island. The southern, with Storkersen in charge, was on the Dundas Peninsula side of Liddon Gulf about 15 miles northeast of Cape James Ross and a mile inland; the northern, an advance base in charge of Aarnaut Castel, was on the coast just west of Cape Grassy, Hecla and Griper Bay. The location of both camps was determined by the finding of bituminous coal; at Cape Grassy only, however, was the supply good in quality, abundant, and of easy access. At Cape Grassy mineral oil, or asphalt, was also found.

The chief business of the winter was sledding dried meat and fat from Liddon Gulf, where the animals were killed, to Cape Grassy, about 150 traveling miles from the southern camp. But because of the non-arrival of the *Polar Bear* we were seriously handicapped in the dark-days travel by lack of lanterns and kerosene both for light and cooking. Instead we had to use seal oil and coal, neither of which is convenient in comparison with kerosene or alcohol. The shoeing of our sleds was also nearly worn out, for Melville Island is prevailingly rocky; indeed, for wearing down runners the whole place might almost as well be paved with files and grindstones as with its native jagged, frost-broken rock. We did not positively remember, any of us, whether Bernier had made a cache at Winter Harbor in 1910, but for the sake of possible iron and kerosene we sent a sled there in October. We intended it should go to Dealy Island as well, for some of our men unfortunately had developed a taste for tobacco out of proportion to our resources, and it was supposed tobacco was to be had at Dealy Island. The team never went beyond Winter Harbor, however, for Bernier's cache there was found to contain, besides the iron shoeing for sleds and the kerosene (50 gallons) that were priceless to us, also several tons of foods such as pemmican (salty), beef extract (half of it rock salt), pilot bread, flour, pork, honey, preserved fruit, and in general the very assortment of foods which, while it does not invariably produce scurvy, is yet the common prelude to it. I had previously hoped that the Dealy Island cache might have its food all spoiled; this hope was now unavailing, for the Bernier cache contained several tons. The temper of our men was such that I did not try the experiment of keeping them on meat straight, but merely cautioned them to eat fresh meat at most or all meals. Neither did I allow more than a limited number of packages to be opened at either of our permanent camps, but on those sled trips where I was not myself present the amount of groceries consumed was at the men's discretion. I mention this here because it has a bearing on a serious thing that happened later.

ARRIVAL OF "POLAR BEAR" PARTY

The winter of 1916-1917 we fed in Melville Island seventeen persons and over forty dogs. By February most of the dried meat and fat had been collected at the Cape Grassy advance base or else been eaten up by men or dogs. On the last freighting trip there the dogs unfortunately lost much flesh through a miscalculation of the dog feed for the last return journey, and we lost ten days or so by waiting till they were in flesh again. By this time we had concluded that the *Polar Bear* had probably been wrecked the preceding summer, for had she remained where she had previously wintered a party from her should have arrived long before this. We were surprised, therefore, when a party from her actually arrived the last of February and astounded when we learned that she had suffered no damage but had sailed a hundred miles farther away from us instead of coming north and was now wintering at Collinson's old base, Walker Bay, Victoria Island. The details which led to that proceeding are too many and complicated to be related here. The main thing just now was that this party from her brought us five men and over twenty dogs but no dog feed and not nearly enough man food to provision the extra men as well as we were already provisioned, per capita. I made here a serious mistake. I should either have left these men and dogs in Melville Island or sent them right back to the *Polar Bear*, for, when we later ran out of food, it proved we lost more time at a critical stage in the hunting of fresh meat than we gained by the service of the fresh men and dogs. Had we had only our original sleds we could have left the Cape Grassy base with all teams hauling dried meat and fat only; as it was, three of our seven sleds had to haul green meat, which is heavy and inconvenient to handle when it is hard as a rock from frost. The *Polar Bear* party had brought us Primus stoves and additional kerosene. Those things added greatly to our comfort, though they did not tend proportionally, if at all, to increase our mileage.

ADVANCE NORTH OF FIRST ISLAND

It was past the middle of March when the last sleds left the Cape Grassy camp, and by the first of April we had completed the survey (roughly) of what remained yet to do of our First Island to Cape Mamen and a few miles beyond (to the northwest).

It was now time to send back our first support party. I had wanted Karsten Andersen to be one of the advance party, but he now told me that he had been ill for some two weeks and was feeling more sluggish and weaker each day. On examination he proved to have symptoms of scurvy, but as I then thought he had been living all winter mainly on fresh meat I took his ailment to be pyorrhoea, together with some constitutional disorder. The first week of April from a point about 50 miles from land and 30 from the shore floe I sent back the support party, instructing Storkersen to take most of our people from Melville Island to the *Polar Bear*. Castel, accom-

panied by Andersen and four Eskimos, I instructed to proceed to the Cape Kellett base by way of the Bay of Mercy, Cape McClure, and Prince Alfred Cape, searching on the way for a party who, our men from the *Polar Bear* told us, had gone from Cape Kellett with mail for us in the early winter. No such party had reached us in Melville Island, and we feared misfortune had overtaken them.

STORKERSEN'S SURVEY OF VICTORIA ISLAND COAST

Storkersen also had instructions to make up a party on his arrival at the *Polar Bear* and try to reach Amundsen's (Hansen's) farthest on the northeastern coast of Victoria Island. Although out of its chronological order, I shall say here that, through a slip, he made this journey without a map or other record of the mathematical position of Cape Nansen (Hansen's farthest) and that he did not know at the time of his turning back from the survey trip that his turning point was a few miles short of Cape Nansen. An additional reason for his turning back was the discovery of an island apparently considerably more than twenty miles in length lying north of the northeastern corner of Victoria Island. It appears that Hansen and Ristvedt just missed seeing this island. The coast line of Victoria Island is therefore now completed beyond the probability of the future discovery of any conspicuous geographic feature not already indicated either by Hansen or Storkersen. The land east of Wynniatt's farthest (Glenelg Bay) proves to run well to the north, thus forming a great bay having its western limit at Peel Point. This I have called Wynniatt Bay, and the strait separating Victoria Island from the new island to the northeast is Hansen Strait. A range of fine mountains lying roughly parallel to the northern coast of Victoria Island I have named Shaler Mountains.

On his way back Storkersen was compelled by the advancing thaws to abandon his sleds in Collinson Inlet and to cross Victoria Island thence to Walker Bay. This crossing had its own interest and had been recommended by me should time not allow a crossing from Hansen's farthest, which would obviously have been preferable. His party arrived at the *Polar Bear* about the end of July.

ICE CONDITIONS IN THE POLAR SEA

To resume the narrative of our own movements: At the shore floe we killed some seals, but in general game was not abundant, comparatively, on or in the sea north of First Island.

The journey north-northwest from Cape Mamen was of special interest to us, as the ice conditions were so markedly different from any we had seen before. In other years the ice had been of the mobile type described by Baron Wrangell and by Leffingwell and Mikkelsen, where no sane man would leave a cache expecting to pick it up on the return journey. But on the ice north of First Island a cache, if made, could probably be found.

When we eventually turned back we did not try to follow our old trail, though it is more than likely we could have done so. We learned nothing of the mobility of the ice under the influence of a north wind, for unfortunately none such blew while we were at sea, and such a wind may be capable of producing considerable motion in the ice; but a series of strong easterly and southerly winds produced a westing and a northing of about three miles only. This could all have been accounted for by the widening of the First Island and Isachsen Land shore lead, for that lead we have seen open four or five miles at right angles with the trend of the shore floe—i. e. northwest. This we noted in our journey along that lead in 1916. The same winds that gave us three miles of motion near 80° N. and 111° W. would have given thirty to fifty miles in the Beaufort Sea south of 74° N.

More than 90 per cent of the ice seen in 1917 north of First Island was either of the type termed paleocrystic or pressure ridges made of the younger ice that had formed in temporary leads and was now crushed into pressure ridges. There was terrific pressure both with and without local winds, but the great thickness of the paleocrystic ice (doubtless averaging over twenty feet) prevented its ridging extensively, though it cracked in all directions.

SUBMARINE RELIEF

But perhaps the most striking thing observed was the character of the sea bottom. At the shore floe some fifteen miles from land the depth was 468 meters; ten or fifteen miles farther from shore it was 456 meters and ten miles farther still it was 444 meters. Then it started deepening till we had 570 meters about seventy-five miles from land, after which it gradually shoaled again to 502 meters at our farthest, which was near $80\frac{1}{2}^{\circ}$ N. and 111° W. Later in the summer, when we ran a line of soundings across Melville Sound from Cape Providence to Peel Point and then to Point John Russell, we found the depth of that sound to be generally about 450 meters and that it deepened and shoaled irregularly much as our sounded area does northwest of First Island. Going north from Alaska the sea deepens roughly a fathom to the mile till about forty miles from shore, after which there is a steep slope to a depth of 1,386 meters with no bottom reached. The slope is more gradual west of northern Banks Island and west of southern Prince Patrick Island, but still in both those regions it goes below 1,000 meters in less than fifty miles from shore. In the region of First Island the deepening is 34 meters only in over a hundred miles of increased distance from land. On the west coast of First Island we found a depth of 70 meters in 1916 less than a quarter of a mile from shore and 250 meters three miles from shore, if I remember rightly. In that same sudden way does Melville Sound deepen away from Melville Island and Banks Island. In the summary of our work in the *Review* (March, 1918, p. 241) the view is advanced that it would seem that "no land exists west of the known limit of the American Arctic Archipelago." It seems to me

that that conclusion would have been much more strongly supported had we found a deep ocean northwest of our First Island and of Isachsen Land. But instead of a deep ocean we found a shallow sea which did not deepen materially as we left the known lands behind. In this connection the soundings of MacMillan northwest of Cape Thomas Hubbard would interest me greatly, but I have not yet heard what they were.

TIDAL OBSERVATIONS

With reference to the theory by which Harris and others have inferred a land to the north of Alaska, our tide observations should prove of interest. We took ten-minute observations for more than twenty-four hours in each of the following places: Cape Isachsen, Hassel Sound, and the southern end of Third Island. All these have local time, determined instrumentally on the spot, and, as will appear later, the sounding places are "tied up" with Parry's observation spot at Winter Harbor. We also had tide observations taken for a month at Cape Kellett and for most of a winter in Prince of Wales Straits.

RETURN TO LAND WITH SCURVY-STRICKEN MEN

I think it was in the last third of April that two of my three companions began to complain of illness. The men I had were Harold Noice and A. L. Knight, both from Seattle, and the Eskimo Emiu of Nome, Alaska, where he has a reputation (under the name of Split-the-Wind) as a long-distance runner. The sick men were the two whites, and their symptoms were those of scurvy. It was only now that I learned that they (as well as Karsten Andersen, already sent home sick) had been living half the winter mainly on the groceries of the Bernier cache. I was worried at this time also about my remaining companion, Emiu, for he, too, had lived much of the winter, I now learned, on groceries also. He was not stricken, however, perhaps because he had the last few weeks eaten a good deal of raw fresh meat, probably the best of all anti-scorbutics. The white men, not at that time realizing their imminent illness, had eaten little meat and none of it raw.

It was an uncomfortable situation to have two men out of four taken seriously ill over a hundred miles from land. Their disinclination to eating meat disappeared magically when they were confronted with scurvy and its associated dangers, but it happened that we had just finished feeding to the dogs the last seal meat shot some days before and were in a region where seals could not be expected to be numerous. Naturally they are to be found only in leads that run partly through ice formed not later than the preceding autumn, and now we were in an area almost exclusively palco-crystic. We, therefore, turned at once towards the nearest land, Cape Isachsen. I knew that should the shore lead there be open we could get seals and should it be closed we could proceed inland looking for reindeer. The advance of the scurvy seemed temporarily checked by eliminating pem-

mican and salt from the sick men's diet and substituting cereals and chocolate.

A gale at this period broke up the ice badly, and, as the weather was no longer cold enough, the leads refused to freeze over quickly, and we had to make numerous expensive detours to find crossing places. Before we were half way ashore the advance of the disease had compelled Noice to ride whenever the going was good, and the last few days he rode always, except when crossing actual pressure ridges or dangerous spots over thin ice. Knight was able to walk all the way to shore, and both men showed excellent spirit in being as useful as their rapidly lessening strength and increasing distress allowed. Emiu, the Eskimo boy, was excellent.

It was about the first of May that we landed south of Cape Isachsen, for the lead was not open at the edge of the landfast ice and stormy and cloudy weather prevented seals from basking on the ice. The first day of our following the coast southeast we saw not a single sign of reindeer. I followed our usual method of hunting inland parallel to the course of the sleds, which followed the coast from promontory to promontory. Both the sick men now rode. The dogs were getting tired from hard work every day for weeks. When we landed we had left for them only two slim meals, consisting of worn-out and other not pressingly needed boots and various skin clothes. For ourselves we had food for about six days at half rations. As we were several hundred miles from our vessels, with sick men and tired dogs, the situation would have been serious had we not been equipped to secure food as we went along. As it was, the chances were several to one that we could shoot something before our strength gave out.

And so it proved. The second day ashore I found fourteen reindeer and got them all. Three days later both invalids told me that nearly all their symptoms of pain and distress were gone and that when they lay still they felt well. They were, however, too weak to walk, their teeth were so loose as to be easily plucked out by the fingers, and their gums were of a consistency nearly approaching that of cheese or of the white of a hard-boiled egg and could be cut with a toothpick easily. Two weeks later the teeth were firm in their sockets, the gums were harder, though not back to natural firmness, and the men felt perfectly well and eager to be moving. When we started, however, they did not prove to be able to walk more than five miles a day for the first few days. The rest of the time they rode, for our dogs had gained strength by their rest and ample feeding on reindeer meat.

SOJOURN IN ISACHSEN LAND

During our seventeen days in Isachsen Land we rated our watches, finding the rate to be practically what it was in the winter. We killed about thirty reindeer and saw a half dozen more. There are no muskoxen in any of the islands discovered by us nor in the Ringnes Islands, nor did we see the track of a bear from leaving the home camp in Melville Island

till reaching the south side of Ellef Ringnes Island on our way home. The reindeer are only half the size here of the Barren Ground caribou of the Horton River or Coppermine River country on the mainland, so we needed every pound of the meat we killed for ourselves and the dogs. In our hunting we made some corrections in the outline of Isachsen Land, which we found considerably narrower than indicated on Admiralty Chart 2118. It is also highly probable that the Dyrebugten and Dronning Louise Fjord are not two bays, as shown on the chart, but a strait separating Isachsen Land from Ellef Ringnes Island proper. It looked so to us from the high land of Isachsen Land, but there is a chance we were deceived by a fog. Certainly, were it not for Captain Isachsen's map we should, had we been the original discoverers, have set this down as a strait.

SOUTHWARD BY WAY OF THIRD ISLAND AND EAST COAST OF MELVILLE ISLAND

From the southwestern corner of Ellef Ringnes Island we crossed to our Third Island but were unfortunate in finding no seal hole through which to sound. The ice was all of the paleocrystic type, and Emiu, who had crossed this sea in Castel's party the year before, recognized pressure ice previously seen, so we know this ice did not move in 1916. We also know that the ice between First Island and Melville Island moved neither in 1915 nor in 1916. It is clear, however, that this ice moves in certain seasons. The inner part of Hecla and Griper Bay thawed in 1916, but the outer ice did not move. Liddon Gulf was open in 1916, but its ice did not shift in 1915. Byam Martin Channel is undoubtedly open every season, for its remarkably strong currents were already shifting the ice in early June, 1917, making a break-up in early July probable.

In 1916 we had spent 27 days at a point near the southern end of Third Island, where we had that year carefully rated our watches. We now secured a reliable observation at the same place, and by going directly thence to Parry Rock at Winter Harbor we "tied up" our observations with that well-located spot.

On our way south along the eastern coast of Melville Island we examined two cairns without finding any records, though no one has visited those places since the Franklin Search. On the southeastern corner of Melville Island and at various points on the southern coast we picked up records of the Bernier expeditions.

EVIDENCES OF COASTAL ELEVATION

Bears, seals, muskoxen, and reindeer abound on the eastern coast of Melville Island. On the southern third of the east coast we found the skeleton of a moderately large bowhead whale several hundred yards inland and—as I remember it—twenty or thirty feet above sea level. From the embayed character and drowned valleys of the west coast of Banks Island it appears that that coast has sunk, though driftwood well above present

high water may indicate that a new elevating movement has commenced. But all our new islands as well as the Ringnes Islands show clear evidences of extensive elevation of coast lines, which still is in progress. A log of driftwood found on the southern coast of First Island is so much larger than any driftwood now found on the mainland coast that the presumption is it did not come from either the Yukon or the Mackenzie River system—at least, it could not have come from any forests now flourishing there. This log is some distance above present high water. Generally speaking, there is no driftwood in any of the islands discovered by us.

We found a tusk, but no other mammoth remains, in Melville Island. Crustacean fossils have been found in various islands. Formation of ground ice, as previously described in a contribution of mine to the *Bulletin of the American Geographical Society*,¹ was observed in active progress in various places, notably near Cape Isachsen, on the northwestern coast of Second Island, and in Hassel Sound. The elevated beaches in these islands are marked in part by hummocks originally formed by ice pressure that thrust tongues of ice into the beach and thus buried ice fragments there.

ACROSS TO BANKS ISLAND

We stayed three days at the Kellett-M'Clintock cache on Dealy Island. The new roof placed on it by Bernier was of no service for the same reason that the original roof was inadequate—the house is built near a cliff several hundred feet high, and the snow consequently piles over it to such a depth that the weight of it needs must crush any ordinary roof. On July 3 only the southeastern corner was seen sticking out of the snow bank, but three days of exceptionally hot weather revealed the whole house. About half the stores are still fit, and certain foods, such as currants in barrels, are better than any fresh we ever tasted. Keeping them, under the conditions of this cache, has improved them somewhat as a similar storing would improve wine.

From Cape Providence we crossed to John Russell Point, running a line of soundings across with an average depth of 450 meters and an abrupt sea bottom slope towards both lands. We reached Banks Island July 25 to find the ice in Prince of Wales Straits already in motion. Proceeding south along the coast we later found that the straits could have been navigated as far north as the excellent harbor at John Russell Point as early as the first week of August. From the remarkably ice-free condition of these straits in the summer of 1916 also, I judge that the Northwest Passage as discovered by McClure is no more hazardous or likely to be interrupted in Prince of Wales Straits or Melville Sound than it is in several other of its links, such as, for example, the rounding of Point Barrow.

A short way (about five miles) south of what probably is intended for

¹ *Underground Ice in Northern Alaska*, Vol. 42, 1910, pp. 337-345.

John Russell Point we found a copper cylinder containing a record signed by McClure saying, in substance, that from this point he had seen the waters of Melville Sound, thus discovering the Northwest Passage. The document had been written by someone other than McClure. It was dated aboard the *Investigator* in winter quarters in the spring of 1851 and had been sent to this point to record the discovery made the preceding autumn. The winter had been comfortable; there was no serious illness aboard; the cache on Princess Royal Islands is described; and a request is added that the record be forwarded to the Secretary of the Admiralty. The cairn for this record must have been solely of sand, for no vestige of it had been left by the strong winds that are frequent in this region. As the land does not conform well with the chart here, the discovery of this record was a remarkable accident—I was hunting reindeer and found it on the level north bank of a small stream about half a mile inland.

CORRECTED POSITION OF NORTHEASTERN CAPE

The record says that John Russell Point was located by lunar distances. The well-known uncertainty of this type of observation, especially if made but once and under the discomfort of cold weather, may account for the fact that our time observations here, when referred to Winter Harbor as given by Bowditch, place John Russell Point about a degree of longitude farther west than does Chart 2118. In conformity with this result, we found the northeastern corner of Banks Island to be far less peninsular in its outline than the chart indicates—the map makers seem to have stretched the land eastward to meet the requirements of an incorrectly determined longitude.

INTERIOR DRAINAGE OF BANKS ISLAND

A comparative scarcity of game compelled us to abandon the coast after about fifty miles—otherwise we should have followed it south to Jesse Bay, crossing thence to Cape Kellett, for I should have liked to make a new survey of the coast. However, the overland journey had its compensations, for we found some large lakes that are the headwaters of the large river that enters the sea about six miles west of the Bay of Mercy. These lakes lie less than ten miles from the east coast of Banks Island, just north of the Princess Royal Islands. We can now locate with rough accuracy all the watersheds of Banks Island. The main one runs from just east of the Bay of Mercy to a point within about five miles from the eastern coast near the Princess Royal Islands and thence roughly to Nelson Head. By far the largest river is the one which in 1915 we traced from its mouth just west of the Bay of Mercy to where it is about 20 miles from the eastern coast a little north of 73° N. and the lakes of whose headwaters we have now found a little to the southeast. This gives a canoe route uninterrupted by serious rapids and deep enough for a small gasoline launch from within ten miles of the middle of the eastern coast of Banks Island to McClure Strait.

COAL ON BANKS ISLAND

We had abandoned our two sleds near John Russell Point and were traveling with thirteen pack dogs at the rate of about ten miles per day, a common average under such conditions. In the interior of the island we discovered a coal mine. Captain Beneard had found coal afloat a year earlier near Cape Kellett, and there is probably a deposit to be found up one of the small stream beds there. Coal is also found at many points along the northern coast of the island. The deposit 80 miles east-northeast from Cape Kellett burns in the manner of thoroughly dry wood and with a fragrant smoke; the other deposits are real lignite of various degrees of excellence. We have specimens of coal from most of the deposits noted as well as of rock from several places in each of the islands discovered or visited.

ARRIVAL AT CAPE KELLETT

On arriving at Cape Kellett August 17 we found the *Mary Sachs* had been repaired and launched by Castel's party according to my orders but had later on been made unseaworthy and was now a wreck broadside on the beach. From two men, Otto Binder and Gustav Massik, to whom the remains of our Kellett base had been turned over as a trapping camp, we learned the surprising news that we had not been expected back at Cape Kellett that summer and that the *Polar Bear* and all our men had left Banks Island August 12, the captain saying the season was so late he did not dare to stay longer.

We learned, also, of a tragedy of the previous winter. Captain Peter Beneard and Karl Thomsen had attempted in the midwinter to carry mail to us in Melville Island and had lost their lives. Our search party had found the body of Thomsen but had not found Beneard or the mail. As no white person survived at Cape Kellett and Beneard had confided nothing to the Eskimos, we do not yet know why this trip was attempted, as my instructions to Beneard were that he was not to leave the Cape Kellett base and that no attempt should be made to bring us mail. Doubtless Beneard saw some special reason for not following those instructions, for he had through the whole expedition been one of our most faithful and trustworthy men.

DEPARTURE FOR CAPE BATHURST AND HERSCHEL ISLAND

It looked the latter part of August as if we were destined to be marooned on Banks Island. We should have suffered no want, for game is reasonably abundant, but through lack of equipment we should have been able to do no scientific work and the year would therefore have been tedious because unprofitable. The prospect was brightened the last days of August by the arrival of the trading schooner *Challenge*, which I promptly bought and with which we sailed inside the twenty-four hours. We had little hope of overhauling the *Polar Bear*, which now had two weeks the advantage of us.

But it later developed that her hurry to leave the Aretie had not been equal to her desire to get away from Cape Kellett and that she had gone to Cape Parry, had hunted caribou there for some days, and, on finding game scarce, had returned to Banks Island in the vicinity of Nelson Head, where several days were spent. As a result, we met her near Cape Bathurst the morning after we left Cape Kellett. The *Challenge* was now of no further use and I sold her at the Baillie Islands (Cape Bathurst).

The captain was discharged at the Baillie Islands and the mate at Herschel Island. John Hadley, who had been carpenter on the *Karluk* and second mate on the *Polar Bear* and had done his work on this expedition with exceptional fidelity, was now promoted to be captain, with Castel for mate and Massik for second mate. Storkersen's exceptional value as a field man had prevented me from making him an officer of any of our ships, for to us the work of the sleds and dogs was much more valuable than that of the ships, which so far had not succeeded in co-operating efficiently with the sled workers. The best base we ever had was that established by Wilkins and Castel with the *North Star* near the northwestern corner of Banks Island in 1915. The year before had been a much better ice season, but in 1915 she could not be taken farther north than Wilkins took her, for the ice north of that point was found by him unbroken and remained so till the freeze-up.

HERSCHEL ISLAND TO BARTER ISLAND

We left Herschel Island about September 10. It had been a bad ice year. The whaler *Herman* under Captain Pedersen's competent direction had been able to proceed but a few miles beyond Cape Bathurst and the Hudson's Bay Company's *Macpherson* had taken the *Herman's* failure as conclusive and had not proceeded beyond their post at Bathurst. There was much scattered ice everywhere about Herschel Island; so darkness and fog interfered with our running at night. At the Alaska-Canada boundary Mr. Thomas Gordon of the trading post there told us that the *Herman* had left there some time before, much in doubt of her ability to get out of the Aretie. Mr. Gordon urged our not trying to get out, for he expected the freeze-up any day and we might get caught at an unsafe point on the coast. It now seems likely we should have had no difficulty in getting out, however, but for an unfortunate accident at Barter Island.

We arrived at Barter Island the evening of September 12 at the concomitant closing in of darkness and a fog. There was scattered ice and a strong north-northeast breeze. We decided to tie up in the Barter Island harbor till daylight of the 13th, as fog, darkness, and a high wind go badly together in the midst of ice.

DETENTION FOR ANOTHER WINTER THROUGH GROUNDING OF VESSEL

Towards morning, in the mate's watch, Mr. Castel called me and reported that within the hour the wind had shifted from the north-northeast to

southwest and was rapidly freshening to a gale. I directed him to call the captain, but before the captain reached the deck the vessel bumped bottom, and before we could do anything we were broadside on a shoal within the harbor. It was the opinion of both captain and mate that it was hopeless to try getting afloat till the wind slackened. It is, however, a well-known fact that a gale of this type is commonly preceded by several hours by a rise of tide, usually five feet or over in this region. So it had been now, and before the wind abated the tide had fallen sufficiently so that it was impossible to get afloat till there should be a second southwest gale. This did not come before September 26. By that time the vessel had been unloaded. By putting out both anchors and by the simultaneous use of propeller and winch we got afloat before that gale attained a high enough pitch to prevent our swinging the ship's nose against it. But I feared the time was now too late for a safe passage out, and so we stayed. I now think I was probably wrong in this and that the fall of 1917 was so especially late that we could have left Barter Island the last of September and reached the Pacific before the ice caught us. But in the average season, the last week of September is too late for an easy passage out, and this year we all were obsessed with the premonition of an early fall.

PLANS FOR SPRING EXPEDITION

When once it was clear that we had to winter it became equally clear that we ought to do some exploratory work the coming spring, for here we were in fairly easy reach of the unexplored area, with a better equipment on hand or easily available than we had ever had before and many men drawing pay for work that would be purely non-productive unless we did some spring traveling. Of course there would be some added expense, but then we should have something to show for the money spent.

The plan I settled on was to go with all available equipment about 200 miles north from Cross Island, Alaska (148° W.). From here I would send home all but three or four men and two dog teams, select the thickest available ice cake, spend the summer in accumulating meat and blubber for winter, float where the ice lasted till February or March, 1919, and then start for the nearest land. On the going home of our Southern Division in 1916 we had received good sounding wire and many needed instruments from them and were therefore in a position to take soundings and some other desirable observations, besides the astronomic, as we drifted from place to place.

ATTACK OF TYPHOID

To prepare for this work I went to the Mackenzie delta in the autumn to buy dogs, dried fish for dog food, etc. Meantime Castel maintained at Cross Island a sealing station to provide dog food, and Storkersen and Hadley prepared everything else needed at the ship—such things as sleds,

clothing, condensed rations for men and dogs, etc. I succeeded in buying in the Mackenzie delta (with the invaluable assistance of the Royal North West Mounted Police and the Hudson's Bay Company) some fifty of the best dogs we ever had. In every way our prospects looked excellent, when, the first week of January, with everything ready for a start out on the sea ice by the full moon of February, I was taken with typhoid of a severe form. I probably owe my life to being able to travel from Shingle Point during the first four days of my illness to the Police Barracks at Herschel Island, where I received the best care available from the police, from the missionary, and from every white man in the village.

TRANSFERENCE OF EXPEDITION TO STORKERSEN

So soon as we realized it was typhoid (which was not till I was down with pneumonia complications after a partial convalescence) it became clear that Storkersen would have to take my place in the ice work. By this time the start had already been delayed for my expected recovery from what we at first took to be an illness of not very serious type, and it was not until after the middle of March that Storkersen finally left the land at Cross Island. I do not as yet know any exact details, but I believe he had ten good sleds with about five good and five average teams, in all about eighty dogs. There probably were about fifteen men, five or so of them Eskimos. The Eskimos of this part of the Arctic, however, can be used for the first support parties only, for two reasons: they are afraid of going far from land on the moving ice, and they are unwilling to live on meat only, which all those have to do who accompany the advance beyond the limit of the provisions hauled from home.

For the present Storkersen's chances of success look good. He has ten sleds against the three we had on the corresponding trip in 1914; most of his sleds are good ones, while only one of our three was good in 1914; his dogs average much better than ours, and he will be able to pick two six-dog teams at the last where each dog will be equal to our good ones of 1914, when the good dogs were only four in number.

It proved, however, that the plan of drifting for a year on the ice had to be abandoned when I could not myself go. I then expected that Storkersen would go about north to 74° N. and then west and south to Wrangell Island or Siberia, keeping about a hundred miles outside the *Karluk* drift track. I have received no report from Storkersen or Hadley since Storkersen left me ill at Herschel Island, but it is now rumored that instead of going north and west Storkersen plans to go north and east, perhaps to Cape Murray. This is entirely feasible, if he has as good luck as we had in 1914, for he got an earlier start and has better sleds and dogs, but there is the disadvantage of his having to cross areas we have already explored should he not be able to get beyond 76° N. Should he land on First Island or Prince Patrick Island before July 10 he should reach

Kellett before the end of August, in which case he will be picked up there by the Hudson Bay Company's *Macpherson*, which now aims each year to supply the new trading post Fort Bacon on Dolphin and Union Straits and therefore passes the south end of Banks Island twice a year. They will call at Cape Kellett in September or late August this year and pick up Storkersen's party, unless another vessel picks them up sooner. Two vessels that may call there are the *Herman*, which, I suppose, is still under command of Captain Pedersen, and Leffingwell's *Argo*, now owned by Mr. Samuel McIntyre.

Storkersen probably carries about 2,500 meters of sounding wire. He has three excellent watches besides the two we had before and is in every way better equipped than any of our parties previously have been.

JOURNEY FROM HERSCHEL ISLAND TO FORT YUKON

After being in bed at Herschel Island from January 13 to April 3 I finally left on that date for the Episcopal Hospital at Fort Yukon. This is the only hospital within five hundred miles of Herschel Island (as one must travel) and even the only place with either doctors or nurses. Mr. Henry Fry, the missionary at Herschel Island who had been doing all in his power for me, had finally arrived at the conclusion that I should probably not live through if I stayed there and that something else must be tried. Inspector Phillips of the Police had arrived at the same conclusion and now volunteered to undertake the superintendence of my preparations and my journey south should I want to go. I had wanted to go a week or ten days earlier, but had then been dissuaded from doing so by those who thought the journey might be beyond my strength. Now that all agreed I must go south, Inspector Phillips soon had the party ready, and under the charge of Constable Broekie we started on April 13 with two Eskimos and an Indian driving three sleds. Mr. Fry at first intended accompanying us, but, when the first day's journey showed no ill effects but on the contrary marked improvement in lower fever and increased appetite, he saw that he was not needed and turned back. It took us eleven days to the Poreupine River at the mouth of the Old Crow River.

A week or more before I left Herschel Island a party of three Indians from the Poreupine basin at the head of the Old Crow River came to the island to buy certain things from the Hudson's Bay Company's store there. I had heard before of the presence of a physician at Fort Yukon but did not know but the war or other conditions might have taken him away. One of the Indians offered to carry a message for me to Fort Yukon and to accompany the doctor thence to Herschel Island should he be willing and able to come. But at Herschel Island the opinion prevailed, and was even shared by me, that the doctor would probably not come. At the mouth of the Old Crow, Mr. and Mrs. Schulz of the trading post there told me from intimate acquaintance with Dr. Burke of Fort Yukon that he would

STEFANSSON'S AND MAC MILLAN'S RECENT EXPLORATIONS IN THE AMERICAN ARCTIC ARCHIPELAGO

Scale 1:9 500 000
100 50 0 100 200 300 miles

Routes

Canadian Arctic Expedition
Northern Division

Crocker Land Expedition

----- Stefansson

----- Mac Millan

----- Storkersen

..... Ekblaw

• Base or winter quarters

All routes are approximate, and
Stefansson's 1916 routes are conjectural



go to Herschel Island or anywhere else to help anyone seriously ill. I learned here also that my Indian messenger had been traveling down the Porcupine too slowly to suit the white men of that country, and that one of these, Mr. Harry Anthony, had with his better dog team taken the Indian's place and carried my letter to Fort Yukon. I was told that Mr. Anthony would have arrived at Fort Yukon by now and that if I waited the doctor would soon be at the Old Crow and if I kept on I should meet him on the road. As the journey seemed to be doing me good I decided to go on. And indeed at Old Rampart House we met Dr. Burke and his party. They were bound for Herschel Island to spend the summer there or return sooner, as circumstances demanded.

On meeting us, Dr. Burke turned back and we proceeded leisurely towards Fort Yukon. On the way there we were overtaken by the Reverend Hudson Stuck, Archdeacon of the Yukon, who was returning from a journey to Point Hope and Point Barrow and who had reached Herschel Island a day after we left there. We arrived at Fort Yukon on April 27, where my convalescence proceeded satisfactorily at the St. Stephen's (Episcopal) Hospital.

As we expect vessels that must go to Banks Island anyway to pick up Storkersen's party if they come to Cape Kellett, my orders provide that Captain Hadley shall bring the *Polar Bear* to Nome so soon as ice conditions allow. If health permits, I may meet her there in August or September, or I may come south direct. In either case the vessel will probably proceed to the Esquimalt Navy Yard at Victoria, British Columbia.²

² Press despatches reported the arrival of Stefánsson on September 18, at Vancouver, B. C., on his way east. He will lecture before the American Museum of Natural History and the American Geographical Society on October 31.—EDIT. NOTE.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

The Lecture Season of 1918-1919. The lecture program for the coming season will include addresses by distinguished explorers and geographical writers on subjects of current interest. The dates are as follows: October 31, November 19, December 10, December 17, January 7, January 21, February 11, February 25, March 11, March 25, April 8, April 22. The lectures will be given, as usual, in the auditorium of the Engineering Societies' Building, 29 West Thirty-ninth Street. On October 31 Vilhjálmur Stefánsson will lecture on his four years' expedition to the Arctic, from which he has just returned and about the latter half of which he reports in the present number of the *Review*. Later Mr. Theodoor de Booy will lecture on his recent expedition, conducted under the auspices of this Society, to the Sierra Perijá of Venezuela, about which brief mention was made in the August *Review* (p. 172). Another speaker will be Major Douglas W. Johnson, who will give an address on the field studies he has undertaken during the past year under the auspices of this Society as a basis for a report on the relation of physical geography and topography to military strategy.

SOUTH AMERICA

Irrigation in Chile. Central Chile is the granary of the west coast of South America. It must supply the nitrate workers of the desert north and the sheep men of bleak Magellan. This condition is accentuated by the present world crisis in foodstuffs. But from the Aconcagua to the Maule ($32\frac{2}{3}^{\circ}$ - $35\frac{1}{2}^{\circ}$ S.) there is a yearly average of less than 20 inches of rainfall, and, unfortunately, that all occurs in the winter months. The summers are cloudless, dry, dusty. Most of the hillsides and much of the valley floor have been used for nothing but grazing, and for that only during the rainy season. The herds of horses, cattle, and sheep from the *haciendas* are driven to the high mountain grass lands in early spring, their *huaso* herdsmen remaining there with them until winter rains freshen the hillside pastures and untilled flats of the central valley. In addition to this unfavorable distribution of rainfall, the amount varies greatly from year to year. In 1886 at Santiago there were only 4.99 inches, while in 1900 there were 32.26 inches. Rains are brought by the north winds that accompany passing cyclonic centers. These centers often move across the Cape Horn region, and at such times central Chile is well beyond their influence (R. C. Mossman: *Southern Hemisphere Seasonal Correlations*, *Symons's Meteorol. Journ.*, Vol. 48, 1913, seven articles; reference on page 2). Hence Chile has long depended upon irrigation. From Inca times the sediment-laden waters of her numerous streams, that, rising at an elevation of some 10,000 feet in the Andes, reach sea level in less than 150 miles, have been utilized for agriculture. The fields along the river terraces within the Cordillera and the great estates on the piedmont slopes and deep alluvial plains of the central valley would be unproductive were it not for the waters of the Aconcagua, Maipo, Rapel, Maule, Itata, and Bio Bio Rivers. Every mountainside carries its canal, sometimes hanging high up on the slope, sometimes fringing the foothills. Lines of Lombardy poplars and weeping willows border these watercourses, dividing the farms up like checkerboards. The great Maipo canal has been in operation for over a century. Associations of land owners, in some cases individual *hacendados*, have maintained these irrigation systems. Besides turning the river waters upon their land, many Chilean farmers have constructed reservoirs to catch and hold winter rains for use during the growing season (see Roberto Opazo G.: *Los problemas del regadío*, *Bol. Inspecc. de Geogr. y Minas*, Vol. 11, 1915, pp. 271-283, Santiago de Chile). These efforts have made a veritable garden out of a region which otherwise would produce little else than thorny shrubs.

But until recently all irrigation was the result of private enterprise. Consequently, much land was left untilled, and Chile imported wheat from Australia, Uruguay, and California. Now, however, the government (composed almost entirely of wealthy farmers) is making an effort to increase agricultural products. They realize that the nation must be made less dependent upon its great but insecure monopoly of nitrate and must be more self-sustaining, too, in its food supply. Fiscal aid is being extended to the construction of irrigation works. Several extensive projects are under way or already completed. In the beautiful horticultural region of Nos, a few miles from Santiago, an

extensive plant has been installed. It waters 25,000 hectares, or about 62,000 acres (*Bull. Pan Amer. Union*, March, 1912, p. 372). The Cachapoal canal, also made possible by the government loan policy, irrigates 300,000 hectares of grain fields, vineyards, and orchards. Near the Laja River some 45,000 hectares will be made more productive by canals leading from this stream. A very pretentious project that has been approved by the Department of Public Works is that by which canals and tunnels will carry water from the Melado, a mountain tributary of the Maule, through an intervening ridge into the valley of the Ancoa, and from there to the farms of Linares. This is one of the best wheat sections of the country. It also produces excellent grapes and apples. Irrigation on this large scale will reclaim many acres of hitherto uncultivated land (*South Amer. Journ.*, July 28, 1917, p. 56). Even districts in the north are to profit by the government's interest in agriculture. One of the plans includes the construction of dams and reservoirs on the upper Coquimbo, by which it will be possible to irrigate the entire valley (*South Amer. Journ.*, Aug. 11, 1917, p. 86). Coquimbo raisins are famous along the west coast.

As is well known much of the soil in the northern provinces is productive if watered. Evidence of this is furnished by the rapid growth of flowers and grass after each infrequent rain in that desert region and by the band of vegetation that marks the cloud line along the barren coastal range.

Greater use of the Chilean streams for irrigation should also aid in preventing the disastrous floods in many of the rivers, caused in spring by rapid melting of the snow fields and in winter by the occasional heavy rains.

AFRICA

The Faunal Regions of Africa, Based on the Distribution of Fishes. The zoögeographical regions of Ethiopian Africa, i. e. Africa south of the Sahara, as established by Wallace, were four in number—West, East, and South Africa, and Madagascar with the Mascarenes. Recent discoveries have shown that many forms then believed to be peculiar to South Africa are common to East Africa also. Today the zoögeographer, as Heller says elsewhere in this number of the *Review* (p. 301), recognizes two primary divisions of the continent (excluding Madagascar): (1) the humid and forested west and (2) the comparatively dry east and south. With the faunal regions the floral are in general agreement. From the work of Engler (see especially: *Pflanzengeographische Gliederung von Afrika*, *Sitzungsber. Kgl. Preuss. Akad. Wiss.*, 1908, Part 2; *Die Pflanzenwelt Afrikas*, Vol. 1, in two parts, Leipzig, 1910) the boundaries of the floral divisions and their subdivisions have been worked out and represented on a map by members of the staff of the American Museum of Natural History (Engler's own map may appear in Vol. 5 of his "*Pflanzenwelt Afrikas*"; see, under Engler, page 379 of this number). Their map is reproduced on page 744 of a memoir on the "Freshwater Fishes of the Congo Basin" by J. T. Nichols and Ludlow Griscom and is used to illustrate the general conformity with the ichthyofaunal regions of the continent as worked out by them (Scientific Results of the American Museum of Natural History Congo Expedition, 1909-1915; Ichthyology, No. 1, *Bull. Amer. Mus. Nat. Hist.*, Vol. 37, 1917, pp. 653-756).

On the basis of its freshwater fishes the continent in its entirety may be divided into five regions (map on p. 741 of memoir): Northwest Africa; West Tropical Africa (i. e. from the Niger to Angola and west of the Great Lakes); the Nile Basin and Northeast Africa; East Africa with South Africa; Madagascar. The northwestern region is purely northern (Holarctic) in character, the relations with European forms being very close. It coincides with Engler's Mediterranean region. The Madagascar region has no real ichthyological affinities with the mainland. For the remainder of the continent the great dividing line is between the west and the east with the south. The fish fauna of West Tropical Africa is entirely distinctive, and it is much the richest of any of the African divisions. Where the forms of the east are of northern or oriental origin those of western Africa also include many peculiar forms and forms of primitive character which either originated in Africa or have survived there only. The Nile Basin and the northeastern division, which corresponds with Engler's northeastern subprovince, shows a mingling of forms, European and Asiatic and West African. The East African region is as poor in fish fauna as it is rich in the larger mammalian fauna. Most species are related to those of the Nile Basin, and the few western forms appear to have been derived from this source. Lake Tanganyika presents a problem, and a definite position has not been assigned to it. The paucity of forms increases southward, and there appears no reason for making a separate faunal region out of South Africa. However, in the extreme southwest, round Cape Town, there is found the single peculiar African form that is not West Tropical in its range; this is *Galaxias*, confined to the very limited area that Engler separates as a distinct region on the basis of its aberrant flora.

The distribution of peculiar forms has important bearing on the problem of the Antarctic Continent, one of the remnants of ancient Gondwanaland, evidence for which has lately received strong support through the *Glossopteris* flora brought back by the *Terra Nova* expedition from latitude 85° S. (A. C. Seward: Antarctic Fossil Plants, Natural History Results of the British Antarctic ("Terra Nova") Expedition, 1910, Geology, Vol. 1, No. 1, pp. 1-49, 1914). From data now available it appears not improbable that the ancient and primitive types of African fishes originated in South Africa or some other part of the then continent of Gondwanaland which enjoyed humid conditions. Desiccation would cause these forms to become extinct or to migrate to regions of more favorable conditions—to western Africa, where they have persisted.

On Future Boundaries in Central Africa. In tropical Africa, where territorial division has been so rapid a process in so little known a land, boundaries have been developed on the doctrines of *hinterland* and *spheres of influence* (Curzon's "Frontiers," 1907, pp. 43, 44). In consequence the "artificial" frontier figures largely. Such boundaries can only be regarded as preliminary lines. Already certain adjustments have been made; but it is the reconstruction following the war that will give the great opportunity for boundary reform. Tentative suggestions of reform have been put forward in an article "A Central African Confederation" appearing in the *Journal of the African Society* (July, 1918, pp. 276-306, with map, 1:12,000,000) above the signature "Africanus." Discussion is limited to eastern tropical Africa on the thesis that the future shall see a compact British territory from south of the Sudan and Abyssinia to the Zambezi and east of the Belgian Congo and Angola to the Indian Ocean and Mozambique.

In this region existing boundaries are boldly discarded. In place of the existing divisions of Uganda, British East Africa, and German East Africa, and in opposition to amalgamations of the two former or the two latter, as has been proposed, there is propounded a longitudinal division following the main natural divisions of the country. These divisions include a coastal belt running from the Juba to the Rovuma; a highland belt from south of Lake Rudolph to the Mahenge plateau, and a modified Uganda, centered round Victoria Nyanza by addition of the Kavirondo country of British East Africa and of the German territory draining to the lake. It is further proposed to take parts of the Nile and Rudolph provinces from the present Uganda and add them to the Sudan. Northern Rhodesia would remain practically unchanged save for a small addition of similar country round the southeastern end of Lake Tanganyika. The southern plateaus of German East Africa would be added to Nyasaland, giving this heretofore cramped province the head of Lake Nyasa.

The geographical basis for the first three of these divisions is very clearly marked. The coastal belt is the region of tropical plantations. Here, if it be deemed advisable, would be the suitable region for East Indian colonization. The highland belt includes the areas suitable for white settlement. Quite different are the problems in Uganda, which must remain a black man's country. The selection of natural regions for administrative units in the case of these three divisions ignores a principle which the statesman-geographer recognizes as one of the cornerstones of his policy. This is that, to insure stability and permanence, a state should have, second only to racial unity, a diversity of natural regions, in order to make full use of the interplay of economic forces which such a composition implies. However, this principle might be considered less valid in the case of colonies which, because of the stage of their development, were not suited to self-government.

The location of the centralized authority of the confederation is a matter of importance. The question of a central administration for the British possessions in eastern Africa has been discussed before, and Zanzibar has been suggested as the seat for such administration. The present proposal would place that seat in Kivu or some other part of Ruanda. This is as far west as Zanzibar is east, but the situation is splendidly healthful, and the lack of communications, at present the great obstacle, could be amended. The fate of Ruanda as a whole is particularly interesting: though it is a region suitable for white settlement it has a dense native population. Here it is suggested that, excluding an area for the seat of the proposed federal administration, the remainder should be constituted a native reserve.

Mount Kenya: Notes on the Geography of an Equatorial Snow Peak. A snowy equatorial peak should prove an object of particular attraction to the geographer: few, however, have been the observations on Mount Kenya, over 17,000 feet high and lying exactly on the equator east of the Great Rift valley of east-central Africa. The more accessible Kilimanjaro is better known; likewise Ruwenzori. The chief expeditions to Kenya have confined themselves to its western slopes. Teleki, the first European to ascend Kenya above tree line (1887), J. W. Gregory (1893), and Mackinder, who has

made the first and only ascent to the summit (1899), all made their explorations from the west. The Roosevelt expedition skirted the western and northern slopes of the mountain. An attempt on the southeastern slope was made by Dundas in 1891, but the highest point reached was only 8,700 feet. Five years later Kolb reached much the same position on the southeast, while on the northeast he attained a considerably greater altitude (George Kolb: Von Mombasa durch Ukambani zum Kenia, *Petermanns Mitt.*, Vol. 42, 1896, with map, 1:1,000,000, Pl. 17). Hutchins, while engaged in a forest survey of British East Africa, made a complete circuit of Kenya, for most of the distance at an altitude of 12,000 feet, and he has contributed our chief knowledge of the southeastern part of the mountain (Report on the Forests of Kenia, East Africa Protectorate, *Colonial Rept. No. 41*, 1907; see also "Report on the Forests of British East Africa," *British Parliamentary Paper Cd. 4723*, 1909, and A Visit to Mount Kenia, *Scottish Geogr. Mag.*, Vol. 25, 1909, pp. 346-352).

There are considerable differences in zonal distribution between the eastern and western sides of the mountain, especially in the lower forest zone, which is economically the most important. On the west the forest begins at an elevation of 7,000 to 7,500 feet. For the northwest Alluand and Jeannel place it as high as 7,870 feet (Le Mont Kénia en Afrique Orientale Anglaise, *Rev. Gén. des Sci.*, July 15, 1914, pp. 639-644). On the southeast the lower edge of the forest begins about 6,000 feet. Here it is much denser, and the place of the distinctive juniper (cedar) of the west is taken by great camphor trees. The drier west appears to have suffered greatly from fire, and the higher altitude at which the forest begins may be due in part at least to the destructive grazing fires of the Masai. Evidently precipitation is the dominant factor controlling the differences of the vegetational zones. Kenya is exposed to prevailing easterly winds (southeast trade, northeast monsoon). Hutchins estimated that, where the rainfall of the southeastern slope was 80 to 120 inches a year, that of the west was 50 to 90 inches.

The most recent observations on Kenya by Captain G. St. J. Orde Brown (The South-east Face of Mount Kenya, *Geogr. Journ.*, June, 1918, pp. 389-392) emphasize the extreme humidity on the mountain, a fact which explains the low limit of snow (about 14,500 feet on the southeast), as von Höhnel, Teleki's companion, comments, lower than that of Kilimanjaro (Ostäquatorial-Afrika, zwischen Pangani und dem neuentdeckten Rudolf-See, *Ergänzungsheft zu Petermanns Mitt. No. 99*, 1890). For at least nine months of the year Kenya is "covered with mist, varied by heavy rain"; in fact the only months when finer weather can be depended on are February and early March. A marked consequence of the heavy rainfall is seen in the high degree to which the southeastern face is eroded, the gorges here being cut much more deeply than on the other sides. The aspect of the summit from the south is described as presenting the appearance of a broken-down crater lip, from the western side of which the highest point projects as a rocky tooth. A similar interpretation was made by Teleki from the west, but Gregory proved that denudation has removed the original crater wall and that the final peak represents the eroded central core of the ancient volcano. Further exploration of the peak would be desirable, and, according to Captain Brown, who offers practical suggestions for such an undertaking, it should not prove difficult to anyone with mountaineering experience if made at the proper season of the year.

AUSTRALASIA AND OCEANIA

Rainfall Maps of Australia. The Australian Commonwealth Bureau of Meteorology, Melbourne, has distributed its rainfall maps for 1916 and 1917. For each year the mean annual rainfall is shown on a large sheet, on the reverse of which there are twelve small maps showing the monthly rainfall. On the latter the areas which had a rainfall above the average are shaded blue, while those which had no rainfall, or less than "10 points of rain," are colored light brown. The general conditions of excess or deficiency are thus clearly indicated. Another set of small charts shows, for the last eight or ten years, the areas which had above the average rainfall. The discussion of the mean annual precipitation for 1916 and 1917 is clear and instructive, an especially noteworthy feature of this discussion being the emphasis which is laid on the *controls* of the rainfall of each year. In far too many cases such a text is merely a statement of the *facts* of rainfall amount and distribution, which facts can, of course, be easily seen on the charts.

The year 1916 was a remarkable one on account of the extraordinarily abundant rainfalls of the winter, spring, and early summer. These seem to have been the direct result of remarkably sustained air movements from the tropics over the more temperate latitudes. From June to December there was no month in which the rainfall was not a record over some portion of the Commonwealth. Disastrous floods occurred in many sections, notably in September, early October, and again in December. Curiously enough,

the weather conditions in 1917 were very similar to those of the preceding year, the air movements from the tropics into higher latitudes being maintained practically throughout the year. Therefore, a record wet year was again recorded at many stations. It is an interesting fact that the air-drift from the tropics in 1917 appears to have been preponderantly from the northwest. Hence the rains were more abundantly distributed on the northwestern than on the southeastern slopes of the highlands on the eastern and southeastern coasts of Australia. Very disastrous floods occurred at many places during the year, as in 1916. The occurrence of these two years of unusually heavy rains naturally lends peculiar interest to the conditions of the years which are to follow and to the search for the ultimate causes of the marked air movement from the tropics which brought about these wet years.

R. DEC. WARD

POLAR REGIONS

Recent Economic Developments in Spitzbergen. While much of eastern Spitzbergen remains unknown, the greater part of the west has been completely surveyed. With the exception of Prince Charles Foreland, a long island off the west coast, of which an exhaustive survey has been made by Dr. W. S. Bruce, the surveys have been conducted by Norwegians. Norway's scientific interest in Spitzbergen began in 1906 with the work carried out in King Haakon VII Land by Isachsen. The course of the successive Norwegian expeditions has been carefully followed in the contemporaneous issues of *La Géographie*. The last number of *La Géographie* (Vol. 32, 1918, pp. 96-101) gives a preliminary report of the 1917 expedition to Spitzbergen commanded by Adolf Hoel and Captain Sverre Røvig.

The work of the expedition was considerably impeded by unusual ice conditions, following an extraordinarily severe winter. The mean temperature of each month from October, 1916, to August, 1917, was below normal, April being 10° below. The work of the hydrographic party suffered most keenly. The field of their operations, from Ice Fiord to Bell Sound, the two major re-entrants penetrating from the west the south-central part of the main island, was not clear of ice until August 10 and was closed again on August 26 by masses of ice from the eastern pack doubling South Cape, the main island's southernmost point—a not uncommon event, as Rudmose Brown notes in commenting on the bad ice conditions of 1914 (R. N. Rudmose Brown: Spitsbergen in 1914, *Geogr. Journ.*, Vol. 45, 1915, pp. 10-23).

Topographic work was carried on in the territory pertaining to the Norwegian coal company west and south of Advent Bay, a small indentation on the southern side of Ice Fiord. For the company there was executed a map on the scale 1:10,000, which will permit of an accurate estimate of their coal resources.

The geologists completed the map of the coal-bearing region between Ice Fiord and Bell Sound and carried out researches south of the latter opening. The work accomplished represents the first part of a program designed to cover a period of five years, of which one of the primary objects is the extension of topographic and geologic surveys over the region between Bell Sound and South Cape. The projected work has a distinctly economic bias. Apart from a comparatively small government subvention it is financed by the coal companies interested.

Mention of economic interests inevitably brings one back to the political situation, now more interesting than ever. The war makes the status of *terra nullius* less tenable than before and appears to have rendered impossible any system of joint control (cf. Robert Lansing: A Unique International Problem, *Amer. Journ. Internatl. Law*, Vol. 11, 1917). German designs, revealed in the terms of the treaty of Brest Litovsk, have especially aroused apprehensions in Great Britain, one of the major claimants in the Spitzbergen archipelago. A statement of the British claims has recently been published by the Council of the Royal Geographical Society (British Interests in Spitsbergen, *Geogr. Journ.*, April, 1918, pp. 245-249). Press despatches from London under date of October 2 report the seizure several months ago by a British expedition of German coal and iron mines in Spitzbergen. The expedition was under the command of Sir Ernest Shackleton. A large number of miners, full mining equipment, and supplies sufficient for three years were taken, and work is now going on on a large scale. Captain Wild, who was with Shackleton in the Antarctic, is in charge of operations.

MATHEMATICAL GEOGRAPHY

Standard Time at Sea. In the matter of time-keeping a ship at sea has been "a law unto itself." The general practice has been to keep approximately local time, a proceeding in which there was no exactitude and much liability to confusion. Last year, through the activity of the Bureau des Longitudes, the French Admiralty established a

reform by extending to sea the time zones of the land, a reform subsequently taken up by the navies of Britain and Italy (P. Vincent: *Planisphère des Fuseaux Horaires*, map in 1:72,000,000, equatorial scale, Service Hydrographique, Ministère de la Marine, 1917; L'extension à la mer du régime des fuseaux horaires, *La Nature*, March 2, 1918, pp. 143-144). The results of a conference on this subject held by the British Admiralty are summarized by the *Geographical Journal* for February (Standard Time at Sea, pp. 97-100). The conference recommended the adoption of the boundaries of the time zones established by the French system, with which there was general agreement. Only in two respects were changes proposed, in the decision against usage of summer time on the high seas and in a matter of nomenclature. In the French system the time zones are numbered eastwards from 0 (Greenwich zone) to 23. To prevent ambiguity in reduction to Greenwich time the conference suggested the use of numerals with + signs for zones west of Greenwich (zero) to the date line and — signs for zones east of Greenwich to the date line.

There was also recommended a corollary reform of much practical convenience to navigators, the substitution of the civil for the astronomical day (A. C. D. Crommelin: Time at Sea and the Astronomical Day, *Nature*, April 25, 1918). In one respect the conference failed to arrive at a satisfactory conclusion—the matter of terminology; no adequate equivalent was found for the French *fuseau horaire*; the term “zone” can only be justified on the ground of accepted usage.

GEOGRAPHICAL NEWS

PERSONAL

MR. CHARLES C. COLBY, for some time connected with the George Peabody College for Teachers at Nashville, Tenn., and later with the University of Chicago, has been promoted to an assistant professorship in geography at the latter institution.

PROFESSOR W. M. DAVIS read a paper on “The Peculiar Geographical Features of Northeastern France and Their Bearing on the War” at a general meeting of the American Philosophical Society at Philadelphia on April 18-20.

MRS. NORMAN HAPGOOD (née Elizabeth K. Reynolds), whose article on “The Economic Resources of the Russian Empire” in the April, 1916, number of the *Review* will be recalled, is giving a course in Russian at Dartmouth College. The course is the first of its kind to be given at this institution; the geographical aspects of Russian life are given consideration.

PROFESSOR W. H. HOBBS of the University of Michigan read a paper on “The Relation of Deposits of Iron and Coal to the Great War” at a general meeting of the American Philosophical Society at Philadelphia on April 18-20.

PROFESSOR VAUGHAN MACCAUGHEY, professor of botany at the College of Hawaii, Honolulu, has been lecturing on “The Islands of the Pacific and the World War” at educational centers during the past summer.

DR. GRIFFITH TAYLOR, physiographer of the Australian Commonwealth Bureau of Meteorology, whose work has frequently been mentioned in the *Review*, is giving a course of thirty lectures on Australian geography and meteorology at the University of Melbourne during the second and third terms, commencing June 21. Ten lectures are devoted to meteorology, four to climatology, six to land forms, and ten to economic geography. The group on climatology includes lectures on the control of settlement by temperature and rainfall, and the settlement of the Australian tropics; the group on economic geography takes up individually the resources of the seven divisions, including Tasmania, which constitute the Australian Commonwealth.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

CANADA

Yukon, Northwest Territories, British Columbia

HAWORTH, P. L. **On the headwaters of Peace River: A narrative of a thousand-mile canoe trip to a little-known range of the Canadian Rockies.** xvii and 295 pp.; maps, ill. Charles Scribner's Sons, New York, 1917. \$4.00. 9 x 6.

An account of a summer canoe trip for hunting on the headwaters of the Peace River, chiefly the Finlay and the Quadacha (White River), in British Columbia. Passing up the Finlay to its northern branch, the Quadacha, Haworth, with his trapper guide, Lavoie, followed the latter stream on foot and over the mountains, to avoid the canyon, to its forks. McConnell had previously visited this region (see F. K. Vreeland: Notes on the Sources of the Peace River, British Columbia, *Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 1-24) and mapped a glacier at the source of the north fork of the Quadacha, which fork Haworth now names Warneford River, in honor of a Canadian, who single-handed brought down a Zeppelin at Ghent.

Before McConnell's visit, the explorers of the Hudson's Bay Company had undoubtedly overrun this entire section. A line of forts was established on both sides of the Rocky Mountains from the Columbia River to the mouth of the Mackenzie. Fort Frazer, Fort St. James, Fort McCloud, and others were located about the headwaters of the Peace River on or near the Finlay, and it is stated in the papers of the Hudson's Bay Company that this entire region was well known in the days of "McLoughlin's Transmontane Empire," otherwise called New Caledonia. But, it may be said, men like Frazer, Mackenzie, and McLoughlin were more interested in beaver pelts than in assigning names to the mountains and the ultimate divisions of the principal rivers.

Ten miles or more south of the forks of the Quadacha, according to the author's map, Haworth ascended "Observation Peak" and solved the problem of the white waters of the Quadacha. Though Warneford River rises in a glacier, it "showed clear water, while the east fork was even whiter than the Quadacha" at the junction with the Finlay. The east fork retains, therefore, the name of Quadacha. From the summit of Observation Peak there "unfolded nameless ridges, hundreds of nameless peaks, any of them taller than the highest in the Appalachian system." No elevations, not even of Observation Peak, are given by the author.

The finest mountain, with three peaks, lay to the northeast, distant forty or more miles (by the author's map), and to this mountain he gives the name of Lloyd George. It is the great glacier on the south of this mountain, breaking through from the unseen highlands that extend eastward, that occupies much of the author's space in the description of the country. The northern side of the glacier rests upon the southern slope of Mt. Lloyd George. He says, "I repeat, for emphasis, a great river of ice." Surely a glacier of the magnitude described by Haworth ought to be explored and named for its discoverer.

Haworth then returned to the Finlay and followed it to its confluence with the Fox. He next ascended the southern slope of McConnell's Prairie Mountain. To the northern portion of this ridge, which Haworth followed for a day and a half, he gave the name of Joffre Range. The mountains on the western side of the long canyon of the Finlay received the name of Kitchener Range.

The remainder of the narrative is a description of the country, interspersed with big game hunting. Haworth's account is useful when taken in connection with the records of the Hudson's Bay Company and their scouts of a century ago and with the report of McConnell.

An abbreviated version of this book has appeared in *Scribner's Mag.*, Vol. 61, 1917, No. 6, pp. 647-668; Vol. 62, 1917, No. 1, pp. 58-73. W. S. C. RUSSELL

BROWNLEE, J. H. **Geographical notes concerning known pastoral and agricultural areas in Yukon.** *Dawson Daily News*, Vol. 18, 1916, No. 16, Aug. 17, p. 8.

CAMSELL, CHARLES. **Guide to the geology of the Canadian National Parks on the Canadian Pacific Railway between Calgary and Revelstoke.** 70 pp.; maps, diagrs., ills. Dept. of the Interior, Ottawa, 1914. [“The material for this book is taken largely from the guide books written by D. B. Dowling, J. A. Allan, and R. A. Daly for the excursions of the Twelfth International Geological Congress” in Canada, 1913, which were reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, p. 701.]

CHRISTIE, H. R. **The forests of central British Columbia.** *Forestry Quart.*, Vol. 13, 1915, No. 4, pp. 495-503. Washington, D. C.

HICKSON, J. W. A. **Experiences in the Canadian Rockies in 1915.** Ills. *Canadian Alpine Journ.*, Vol. 7, 1916, pp. 33-47.

HOLWAY, E. W. D. **First ascent of Mt. Edith Cavell and explorations in the Mt. Longstaff region.** Ills. *Canadian Alpine Journ.*, Vol. 7, 1916, pp. 63-66.

PALMER, HOWARD. **Early explorations in British Columbia for the Canadian Pacific Railway.** Map, ills. *Bull. Geogr. Soc. of Philadelphia*, Vol. 16, 1918, No. 3, pp. 75-91.

SMITH, J. G. **Pushing back the frontier.** Ills. Reprint from *Canadian Mag.*, Vol. 45, 1915, No. 5, pp. 379-384. [Recent developments in interior British Columbia north of the Canadian Pacific Railway.]

STONE, W. E. **Climbs and explorations in the Purcell Range in 1915.** Maps, ills., bibliogr. *Canadian Alpine Journ.*, Vol. 7, 1916, pp. 12-32.

STONE, W. E. **Climbs and explorations in the Purcell Range in 1915.** Maps, ills., bibliogr. *Appalachia*, Vol. 14, No. 1, 1916, pp. 19-37. [Different article from the preceding.]

STONE, W. E. **Climbs and explorations in the Purcell Range in 1916.** Map, ills. *Appalachia*, Vol. 14, No. 2, 1917, pp. 133-153.

UNSTEAD, J. F. **The economic resources of British Columbia.** Maps. *Geogr. Journ.*, Vol. 50, 1917, No. 2, pp. 125-145 (discussion, pp. 143-145).

WHEELER, A. O. **Some meteorological phenomena of the Canadian Rockies.** Ill. *Canadian Alpine Journ.*, Vol. 7, 1916, pp. 71-81.

— **Wheaton, Yukon Territory.** 1:62,500. Map 59A. Geol. Survey of Canada, Ottawa, 1915.

— **Windermere, Kootenay District, British Columbia.** 1:125,000. Map 165A. Publication No. 1582. Geol. Survey of Canada, Ottawa, 1918.

UNITED STATES

Western States

DARTON, N. H. **Story of the Grand Canyon of Arizona.** 81 pp.; maps, diagrs., ills. Fred Harvey, Kansas City, 1917. 8 x 5½.

A handsomely printed booklet of convenient size for the traveler to the Grand Canyon. It is full of useful geological and topographical details and closes with a list of place names and their derivation. In view of the author's descriptive power and the extraordinary nature of his subject the reviewer is disappointed in the literary style and general conception of the book. By this it is not meant that a florid style, or even one so enthusiastic as Dutton's, is desirable, but at least there should be a treatment which in dignity and beauty is commensurate with the noble forms and unrivaled colors of the canyon.

WHITTAKER, M. L. **Pathbreakers and pioneers of the Pueblo region, comprising a history of Pueblo from the earliest times.** 160 pp.; ills., index. Franklin Press Co., [Pueblo, Col.], 1917. 9½ x 6½.

A carefully written and well-published account of the rise of the region about the city of Pueblo, Colorado, from a barren expanse to a “magnificent district containing the metropolis of the southern Rocky Mountain region.” As a history of a small section of the greater physical province, the book exemplifies, in general, the conditions of growth in hundreds of settlements in this part of the West, and, as a type presentation rather than for the historical information, it will be found to be valuable to the reader not directly interested in Pueblo. Brief sketches from the lives of the well-known trapper Carson and the explorer Frémont, who, though not directly concerned with Pueblo, were factors in the general westward movement, and stories of a host

of pioneers whose names have gone little beyond the areas of their conquests and labors, add a flavor of romance to the narrative. The hardships and privations of these pioneers, together with their struggles to wrest a living from this inhospitable land, are better measures of the physical environment of the Pueblo country than the actions and responses of the later inhabitants, whose business and social activities result, frequently, from the stimuli of distant and foreign surroundings.

ROBERT M. BROWN

— [Topographic map of the United States.] Sheets: (1) *Arena*, (2) *Arbuckle*, (3) *Atwater*, (4) *Birds Landing*, (5) *Gustine*, (6) *Logan Creek*, (7) *Planada*, (8) *Stevinson*, (9) *Williams, California*, 1:31,680; (10) *Del Norte, Colorado*, 1:125,000; (11) *Camel Mountain*, (12) *Mt. Riley*, (13) *Noria, New Mexico*, 1:62,500; (14) *Reserve, New Mexico*, 1:125,000; (15) *Hillsboro, Oregon-Washington*, 1:62,500; (16) *Wallula, Washington*, 1:125,000; (17) *Moorcroft, Wyoming*, 1:125,000. U. S. Geol. Survey, Washington, D. C., 1917, 1918. [Mt. Riley and Noria, N. M., sheets surveyed in co-operation with the War Department.]

EUROPE

GENERAL

RECLUS, ONÉSIME, edit. *Grande Géographie Bong illustrée: Les pays et les peuples: Vol. 1 [Europe]*. vii and 371 pp.; maps, diagrs., ills. J. G. KERGO-MARD: *Royaume-Uni de Grande Bretagne et d'Irlande*, pp. 3-74; E. A. MARTEL: *France*, pp. 77-196; A. CABATON: *Belgique*, pp. 199-222; A. CABATON: *Hollande*, pp. 225-246; A. RAINAUD: *Italie*, pp. 249-306; ÉMILE BELLOC: *Espagne et Portugal*, pp. 309-364. *Vol. 2 [Europe]*. 366 pp.; maps, diagrs., ills. GUSTAVE REGELSPERGER: *Allemagne*, pp. 3-100; GUSTAVE REGELSPERGER: *Autriche-Hongrie*, pp. 103-174; GUSTAVE REGELSPERGER: *Suisse*, pp. 177-204; PAUL LEMOSOF: *Russie d'Europe*, pp. 207-290; ANTOINE CABATON: *Péninsule des Balkans (Grèce, Monténégro, Serbie, Roumanie, Bulgarie, Turquie)*, pp. 293-359. Bong & Cie., Paris, 1911 and 1912. 15 x 12.

There is a public in France that buys great album-like pictorial works of the most luxurious sort, and when French publishers undertake to fill that need they make sumptuous works indeed. The covers of these books are very elaborate, as if the books were designed to adorn center tables; indeed they are so big and so heavy that they could hardly be used in any other way.

Only a member of this public could adequately review the *Géographie Bong*, a most beautiful, up-to-date work of the sort. An evening spent with it has not sufficed to read its 700 pages nor even to examine carefully all of its excellent pictures of famous towns, buildings, and landscapes, but it has left a distinct impression of a beautiful book that preserves word and picture records of the noted and salient features of Europe. In types, generalizations, and inner meanings it has little interest. A feature is made of views from balloons, the least successful from an altitude of 3,000 meters. From 800 meters and lower there are a number of excellent views of Berlin, Paris, Düsseldorf, and Karlsruhe. There is an admirable balloon side view of the Eiffel Tower and one of Mt. Pilatus. A number of striking views are colored. The text does not limit itself to mere description but adds charming touches of history, of the sort that clings to much of the old-world landscape. The history is quite disconnected; the geography is systematic in a superficial way, in that it treats of the prominent features of each country, including many excellent diagrams of geology, rainfall, population density, and economic distributions. The style is popular but entirely serious and dignified. Withal the work is a good example of pictorial geography.

One other volume in the series has been reviewed previously (Vol. 4, *Africa*, *Geogr. Rev.*, Vol. 4, 1917, p. 327).

MARK JEFFERSON

AFRICA

GENERAL

DU PLESSIS, J. *Thrice through the Dark Continent: A record of journeyings across Africa during the years 1913-16*. viii and 350 pp.; map, ills. Longmans, Green & Co., London and New York. \$4.50. 9 x 6.

The author first crossed the continent from Kumasi on the Gold Coast via Lagos into the Sudan and by the Shari, Ubangi, and Welle rivers to Uganda and British East Africa. Return was made through the volcanic country north of Lake Kivu, the most difficult stretch in the itinerary, and down the Congo. In the third trip the Congo was crossed farther south, use being made of the Kasai and Lualaba Rivers,

the route then running through Northern Rhodesia and Nyasaland. The entire journey of 17,000 miles consumed little more than two years, a tribute to the development of communications in the Dark Continent. For the most part it followed recognized highways and contributes nothing new, but the author saw much that was interesting and describes it well in a pleasant, good-humored style. He has an eye, too, for the broad features of the landscape. Thus he notes the physical affinities of Katanga with the South African plateaus. "At Bukama I seemed to have finally left the Congo proper behind and to have arrived in a country which in outward aspect approximates as nearly as possible to South African conditions." Travel in the Sudan receives the most detailed description. A typical account is that of the tribes dwelling about the Tuburi Lakes, part of the divide between the Benue and Shari systems. These interesting peoples, wealthy and industrious as natives go, occupy a fertile, well-watered country, one of the most densely peopled parts of Africa, "I counted not less than a hundred villages within a radius of three miles, each of which must have held at least a hundred inhabitants." This district, still pagan, calls forth an appeal for Christian missions before Mohammedanism gets a footing. Wherever Islam has entered, the progress of Christianity is retarded, and Islam is strong in the Sudan.

GIBBONS, H. A. **The new map of Africa (1900-1916): A history of European colonial expansion and colonial diplomacy.** xiv and 503 pp.; maps, index. Century Co., New York, 1916. \$2.00. 8½ x 5½.

The book is chiefly political, only incidentally geographical; but none the less it contains some geographical fact and suggestion and will well repay perusal by any student of geography. It does not mention the most conspicuous geographical service that the Germans rendered in their former colonies—the detailed topographical maps that cover all of Togo and large areas in the other possessions. The author thinks that Germany excelled the other colonizing powers in road building for co-operation with railroads, in comfortable accommodations for travelers in the interior, in scientific forestry, and in supervision of the public health. He characterizes the treatment that the Germans inflicted upon their native subjects as atrocious but doubts the expediency of excluding Germany from participation in African development after the war.

The British and Boers are a unit in declaring that they will never consent to the admission of more East Indians to South Africa. They say that "the unrestricted right of entry to these Asiatics would lower the whole standard of living for the white man and make his existence in the country impossible." The British Viceroy in India, who for nine years has protested against the attitude of South Africa, has given up the struggle, and all that is now asked for is that more liberal treatment be given to the Indians already in the country.

CYRUS C. ADAMS

BLESSICH, ALDO. **Geografia storica delle dipendenze continentali: Il disegno dell' Africa Romana.** *L'Africa Italiana*, Vol. 35, 1916, No. 5-6, pp. 81-101.

ENGLER, A. **Die Pflanzenwelt Afrikas, insbesondere seiner tropischen Gebiete: Grundzüge der Pflanzenverbreitung in Afrika, und die Charakterpflanzen Afrikas.** Vol. 3, No. 1 (Charakterpflanzen Afrikas, insbesondere des tropischen: Die Familien der afrikanischen Pflanzenwelt und ihre Bedeutung in derselben), Part 2: Die dikotyledonen Angiospermen Casuarinaceae bis Dichapetalaceae. vi and 869 pp.; diags., ills., index. (Series: Die Vegetation der Erde, Vol. 9, Part 3.) Wilhelm Engelmann, Leipzig, 1915. £1, 14s. 6d. 10 x 7. [Additional volume in the fundamental work on the plant world of Africa by Professor Engler. The whole work is projected to comprise five volumes. Two, besides the present, have already appeared: Volume 1 (in two parts), a general survey, which was reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 44, 1912, pp. 920-921; and Volume 2, dealing with the individual families, a topic continued in the present volume and to include Volume 4. Volume 5, the final volume, will again be of special interest to geographers as it will discuss the vegetational provinces.]

JOHNSTON, H. H. **The importance of Africa.** *Journ. African Soc.*, No. 67, Vol. 17, 1918, April, pp. 177-198.

LEWIN, EVANS. **Railways in Africa.** Maps. *United Empire*, Vol. 8, N. S., 1917, No. 1, pp. 23-30; No. 2, pp. 94-99; No. 3, pp. 172-178.

LIÈVRE, D. **Trois stations hivernales (Le Caire, Alger, Tanger).** Ills. *Bull. Soc. de Géogr. Comm. du Havre*, Vol. 30, 1913, No. 2, pp. 237-248; No. 3-4, pp. 312-336; Vol. 31, 1914, No. 1, pp. 21-32; Vols. 31-32-33, 1914-17, No. 1, pp. 55-72.

ROOSEVELT, THEODORE. **My life as a naturalist, with a presentation of various first-hand data on the life histories and habits of the big game animals of Africa.** Ills. *Amer. Museum Journ.*, Vol. 18, 1918, No. 5, pp. 321-350.

THIERRY, RENÉ. *L'Afrique de demain et le pangermanisme colonial. L'Afrique Française*, Vol. 27, 1917, No. 5-6, pp. 167-175; No. 7-8, pp. 253-263.

TORINO Y ROLDÁN, JOSÉ. *Los ferrocarriles en África. Bibliogr. Rev. de Geogr. Colon. y Mercantil*, Vol. 14, 1917, No. 10-11, pp. 372-424. Real Soc. Geogr., Madrid.

AUSTRALASIA AND OCEANIA

AUSTRALIA, NEW ZEALAND

COTTON, C. A. *Block mountains in New Zealand. Maps, diagrs., ills., bibliogr. Amer. Journ. of Sci.*, No. 262, Vol. 44, 1917, pp. 249-293.

Formerly the mountains of New Zealand, that is to say, the Southern Alps and other chains formed of the older rocks, were regarded as one-cycle fold mountains. In recent years the opinion has been gaining ground that the original fold mountains were more or less completely destroyed by erosion prior to an uplift which initiated the sculpture of the present ranges. The view is now put forward that not only were the fold mountains destroyed by erosion but also that their site was largely covered by younger rocks, and that the later uplifts, to which the present relief is due, were differential. The features to which they gave rise are still, in some parts of New Zealand, well-preserved block mountains, and practically everywhere the tectonic nature of the relief is still recognizable. New Zealand may, in fact, be described as a concourse of earth blocks, the highest of which lie in the northeast and southwest axis of the land mass (C. A. Cotton: *The Structure and Later Geological History of New Zealand, Geol. Mag.*, Vol. 3, 1916, pp. 243-249 and 314-320; reviewed in the *Geogr. Rev.*, Vol. 3, 1917, pp. 83-84).

It is perhaps in central Otago (the southern province of South Island) that the structure and the history of the earth movements are best displayed by the topography. This region is treated in detail in the article "Block Mountains in New Zealand," of which the author sends the following summary:

"The landscape of this part of Otago is a mosaic of blocks. A group of the lower-lying blocks determines a chain of basins, which have been known in the past as old lake basins, though it is not clear that they have ever been occupied by lakes. This is the chain of lowlands followed by the Otago Central Railway. The depressions occupied by large lakes farther west—Wakatipu and Te Anau—were perhaps initially of the same nature, but they have been profoundly modified by glacial erosion. In central Otago the covering strata are largely of terrestrial origin and have been preserved over considerable areas on the low-lying blocks in the depressions, though only a few remnants survive on the higher blocks. The configuration of the higher blocks shows very clearly the nature of the deformation, as extensive areas of the fossil plain that formed the floor on which the cover lay are preserved. The manner in which the fossil plain is warped and dislocated is clearly seen. The majority of the central Otago blocks are elongated, trending northeast and southwest, and are more or less tilted towards the northwest. These blocks slope down gently to their northeastern ends, to merge with the chain of depressions previously referred to, which occupy a complex fault-angle depression at the base of the fault scarps bounding a complex of high blocks forming the northern highland of Otago."

In reference to a principle involved in the treatment of the article thus briefly outlined, attention may be called to recent comment by Professor W. M. Davis. In *Science* for July 26, 1918, pp. 81-84, Professor Davis answers the previous criticism of J. L. Rich that the author entirely omits mention of geological dates (*Science*, Jan. 11, 1918, pp. 43-44). Professor Davis, who has repeatedly protested against the bondage of geography to geology in questions of nomenclature and habits of thought, points out that Cotton's treatment in the above article is systematically geographical in quality. He commends it as an example of freedom from this bondage, as "an admirable experiment in the analytic, systematic, and regional treatment of a geographical problem."

HERBERTSON, A. J., AND O. J. R. HOWARTH, edits. *The Oxford Survey of the British Empire: Australasia, including Australia, New Zealand, the Western Pacific, and the British sector in Antarctica.* xii and 584 pp.; maps, diagrs., ills., index. Clarendon Press, Oxford (Oxford Univ. Press, Amer. Branch, New York), 1914. 14s. 9 x 6.

This volume is one of a series of six covering the respective parts of the British Empire, of which two have already been noticed (America, *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 971-972; Africa, *Geogr. Rev.*, Vol. 1, 1916, p. 70). At the end of each chapter is a rather complete bibliography of the best sources. A gazetteer of

towns, covering 8 pages, and 23 pages of statistics conclude the work. Excellent colored bathy-orographical maps of Australasia, of southeastern Australia, and of New Zealand, many good black-and-white maps and diagrams and interesting half-tone photographs of Australasian scenery help clinch the arguments and inject much life into the presentation.

The several chapters are written by specialists. In this respect the book borders somewhat upon the compendium style. At times the writers seem a bit overenthusiastic and cause one who reads critically to feel that possibly a few points are occasionally strained in favor of Australasia. However, at no time does this reach serious proportions. The book is a study of modern Australasia rather than an historical treatise. It aims to develop the economic phases. So many interesting statements following in quick succession are worthy of review that one hardly knows which to eliminate.

"In Western Australia, wheat farming is possible with an annual rainfall of 12 to 14 inches" without irrigation. This is accomplished where the rainfall is evenly distributed throughout the year. No reference is made to the rate of evaporation. One wonders whether some parts of the United States might not profit from the Australians.

Among the many striking features that will always mark Australia apart from the rest of the world is the fact that "as a whole the extremes of temperature annually, seasonally, and daily are less than those experienced in any of the other continents." Drought is still recognized as perhaps the biggest single handicap to the continent, but hopes are entertained that with the modern developments in agriculture it can be ameliorated, if not perhaps, in some sections, entirely overcome.

"No accurate contour maps have yet been made of any portion of Australia." The geology is likewise, with a few exceptions, still only known in a general way. But much progress is being made. The geological cross-sections, for example, reveal a very considerable knowledge concerning the amount of faulting along the east coast and throughout the Dividing Range.

In the chapter on "Economic Conditions and Industries" the speculative but none the less practical question is raised as to the possibilities, in view of the work that has been accomplished in the evolution of the unexcelled merino sheep, of evolving a "new and distinctive type of Anglo-Saxon people." This of course does not imply a depreciation of the present Anglo-Saxon.

The discovery of gold in the various parts of Australia, the introduction of cold-storage shipping, and the revelation of the agricultural possibilities of the region may perhaps be mentioned as the prime stimulants to progress up to date. All of these have also had their effect upon the distribution of the population. But the outstanding controlling influence is rainfall. "The population is greatest wherever the rainfall is most abundant."

The states control the railroad lines within their territory. The gages are unfortunately of three different sizes. Some steps are being taken to remedy this condition. The telegraph, telephone, and cable are also government-owned. The island character of the country gives it a geographical unity which the people believe will eventually weld them into a homogeneous whole such as no other country might hope to attain. The isolation of the continent has inclined the residents toward the spirit expressed in the words "Australia for the Australians and more Australians for Australia."

The progress of New Zealand, the standards in government that have held the attention of the world, the natural resources, the agricultural development, and the establishment of foreign intercourse are all attractively set forth. Papua as a territory of the Commonwealth of Australia, and a consistently up-to-date presentation of recent exploration in the British sector of Antarctica round out this rather imposing and well-written symposium on Australasia.

EUGENE VAN CLEEF

SCHLICH, SIR WILLIAM. *Forestry in the Dominion of New Zealand.* *Quart. Journ. of Forestry*, Vol. 12, 1918, No. 1, pp. 1-28.

The three islands considered, North, South, and Stewart, comprise 102,912 square miles, with a surface greatly diversified. High mountain ranges stretch from East Cape in the northeast to West Cape in the southwest, and are surrounded by downs, an elevated sea floor eroded to a hilly surface, valuable for agriculture and pastureland. The lower beds are sandy or gravelly—poor soils. In the north clay lands, from which the ancient deposits of kauri gum are dug, are also poor. The plains, with their alluvial soil, are not large but are the important districts for agriculture. The coasts with their wide fringes of shallow sand or gravel beaches afford comparatively few harbors and little shelter for shipping.

The temperature is equitable, the rainfall variable but sufficient for agricultural

purposes, ranging from 200 inches on the west coast of South Island to less than 30 inches on the east coast. The natural vegetation is distinctly semi-tropical, and the wild forest is almost impenetrable on account of the large number of lianas. Three-fourths of the indigenous plants are confined exclusively to New Zealand, and the whole vegetation is strikingly different from that of Australia.

The forests are partly pure but mostly mixed and of very uneven stocking. There remain about 4,000,000 acres of forests fit for milling purposes. The total quantity of commercial timber was estimated in 1909 to be 33,061,000,000 superficial feet, composed of the following (arranged in order of their quality): kauri (*Agathis*, or *Dammara australis*), 1.5 per cent; totara (*Podocarpus totara*), 1.7 per cent; matai (*Podocarpus spicatus*), 10.4 per cent; rimu (*Dacrydium cupressinum*), 46.5 per cent; kahikatea (*Podocarpus dacrydioides*), 7.8 per cent; beeches (three species of *Nothofagus*), 13.3 per cent; miscellaneous, 18.8 per cent.

The existing milling timber will probably be exhausted within twenty years. Up to 1918 about 25,000 acres had been planted by the state and 44,000 acres by private owners. Much more extensive planting of fast-growing species is urgently recommended.

SAMUEL J. RECORD

ANDREW, E. C. **Shoreline studies at Botany Bay.** Diagrs., ills. *Journ. and Proc. Royal Soc. of New South Wales for 1916*, Vol. 50, Part I, pp. 165-176. Sydney.

COCKAYNE, A. H. **Some economic considerations concerning montane tussock grassland.** *Trans. and Proc. New Zealand Inst. for 1915*, Vol. 48, pp. 154-165. Wellington, 1916. [Abstracted under the title of "A Unique Grassland in New Zealand" in the *Review*, Vol. 3, 1917, p. 488.]

COCKAYNE, L., AND C. E. FOWERAKER. **Notes from the Canterbury College Mountain Biological Station: The principal plant associations in the immediate vicinity of the station.** Ills. *Trans. and Proc. New Zealand Inst. for 1915*, Vol. 48, pp. 166-186. Wellington, 1916.

COTTON, C. A. **Block mountains and a "fossil" denudation plain in northern Nelson.** Maps, diagrs. *Trans. and Proc. New Zealand Inst. for 1915*, Vol. 48, pp. 59-75. Wellington, 1916. [The author believes that the present-day topography of New Zealand is due to "a late disorderly uplift." "New Zealand may be described as a concourse of earth-blocks of varying size and shape, in places compressed, the highest blocks lying in the north-east and south-west axis of the land-mass, so that the whole structure may be termed a geanticline." He uses this hypothesis in the interpretation of the physiography of northern Nelson, on the northwest corner of South Island.]

DOWNES, T. W. **New light on the period of the extinction of the moa (according to Maori record).** *Trans. and Proc. New Zealand Inst. for 1915*, Vol. 48, pp. 426-434. Wellington, 1916. [The author believes that the moa of North Island was exterminated by the Maori not long after their arrival in New Zealand, that is not less than four or five hundred years ago, and that its extinction in South Island took place a hundred years later.]

MOORE, E. S. **The active volcanoes of New Zealand.** Maps, ills. *Journ. of Geol.*, Vol. 25, 1917, No. 8, pp. 693-714.

— **New Zealand vegetation.** *Journ. of Ecology*, Vol. 4, 1916, No. 1, pp. 43-45. [A review of D. L. Poppelwell's "Notes on the Plant Covering of the Garvie Mountains, with a List of Species," *Trans. and Proc. New Zealand Inst.*, Vol. 47, 1914, p. 120; W. R. B. Oliver's "The Vegetation of White Island, New Zealand," *Journ. Linn. Soc. London*, Vol. 43, 1915, pp. 41-47; and E. J. Pegg's "An Ecological Study of Some New Zealand Sand-Dune Plants," *Trans. and Proc. New Zealand Inst.*, Vol. 46, 1913, pp. 150-177.]

OLIVER, W. R. B. **The vegetation and flora of Lord Howe Island.** Diagrs., ills., bibliogr. *Trans. and Proc. New Zealand Inst. for 1916*, Vol. 49, pp. 94-161. Wellington, 1917. ["Situated in a tract of ocean which bounds three biological regions of the globe, and on a submarine ridge connecting two of these, Lord Howe Island is at once of intense interest to the biologist. This island, remarkable not only for its biological productions but also on account of its geological structure, lies about 430 km. eastward of the Australian Continent, in S. lat. 31° 32'."]

SINNOTT, E. W. **The "age and area" hypothesis of Willis, recently discussed and endorsed by Professor De Vries ("The Distribution of Endemic Species in New Zealand," *Science*, Vol. 45, 1917, June 22, pp. 641-642).** *Science*, Vol. 46, 1917, Nov. 9, pp. 457-459.

SPEIGHT, R. An ancient buried forest near Riccarton: Its bearing on the mode of formation of the Canterbury Plains. Ills., bibliogr. From *Trans. and Proc. New Zealand Inst. for 1916*, Vol. 49, pp. 361-364. Wellington, 1917.

SPEIGHT, R. The orientation of the river-valleys of Canterbury. Map. *Trans. and Proc. New Zealand Inst. for 1915*, Vol. 48, pp. 137-144. Wellington, 1916. [Discusses the tectonic theory first propounded by Dobson in his report for the year 1865 on "The Possibility of Constructing a Road through the Otira Gorge."]

SPEIGHT, R. The physiography of the Cass district. Map, bibliogr. *Trans. and Proc. New Zealand Inst. for 1915*, Vol. 48, pp. 145-153. Wellington, 1916. [Glaciation has been chiefly responsible for the details of topographic form.]

THOMSON, J. A. Diastrophic and other considerations in classification and correlation, and the existence of minor diastrophic districts in the Notocene. Bibliogr. *Trans. and Proc. New Zealand Inst. for 1916*, Vol. 49, pp. 397-413. Wellington, 1917. [The term Notocene (*νότος*, south; *καίρος*, new) is proposed as an age name for the younger rock series of New Zealand.]

WILD, L. J. On the proposal for a soil survey of New Zealand. Map, diagr. *Trans. and Proc. New Zealand Inst. for 1916*, Vol. 49, pp. 476-490. Wellington, 1917. [The author advocates the adoption of a combined system of soil classification similar to that employed in the United States surveys instead of the geologico-petrographical classification used in England. The combined system groups soils first according to mechanical composition, then subdivides according to chemical composition or other features. It is further suggested that the country should be first divided into soil districts, for which climate should be the criterion. Geological formations yielding soils with unique agricultural properties may give rise to subdistricts. Within the districts and subdistricts soil formation will be classified by the method referred to above. A tentative division of South Island into soil districts is given in illustration.]

WORLD AS A WHOLE AND LARGER PARTS

CLEMENZ, BRUNO. *Kriegsgeographie: Erdkunde und Weltkrieg in ihren Beziehungen erläutert und dargestellt, nebst Schilderung der Kriegsschauplätze.* 278 pp.; maps. (Series: In den Glutten des Weltbrandes, herausgegeben von Felix Heuler, Vol. 4.) Curt Kabitzsch, Würzburg, 1915. M 2. 9 x 6.

This book, Volume 4 of the "In the Glow of the Universal Conflagration" series, is entirely popular in treatment and frankly German in sentiment. The geographical relations of the present war are explained, and descriptive sketches of the various war theaters are given. Its aim is to offer abundant material for private study. The introductory section of 48 pages contains little of geographic interest. Then follow three papers on the Sea and the War, the Sea As a Theater of War, and World Canals and World War. One half of the last is devoted to the strategic relations of the Panama Canal.

The bulk of the book is devoted to a description of the war geography of the belligerent powers of Europe, including Greece and Portugal. The treatment is by political divisions rather than geographical regions. Turkey is found among the principal nations of Asia, and a separate section is given to "Unser Tsingtau." Only Egypt and Morocco of Africa are included, and colonial possessions are hardly mentioned. The American section includes only the "United States of North America" and the Falkland Islands. Australia receives a separate chapter as the fifth continent in the war. The Japanese situation with reference to the United States receives considerable attention. The last three chapters discuss in closer detail certain districts intimately connected with recent military operations. Under "From the Background of the Conflict," we have the Vosges, the Argonne, the Carpathians, the Dardanelles, etc. Under "Scenes from the World War," we have Antwerp, the Masurian Lakes, Przemyśl, and Ukraine. The concluding chapter takes up the geographical bigness, the puzzle, and the lessons of the war. Many excellent relief maps and several charts illustrate the various regions.

JAMES GORDON STEESE

CORBETT, J. S. *England in the Mediterranean: A study of the rise and influence of British power within the straits, 1603-1713.* 2nd edit. Vol. 1: viii and 297 pp., map; Vol. 2: pp. 298-603, map, ill., index. Longmans, Green, and Co., London, 1917. \$5.00 (2 vols.). 8 x 5½.

The consolidation of British naval power in the Mediterranean was the result of protracted endeavor. The long history of preparation and of diplomatic and naval activity is presented in this second edition of Mr. Corbett's book. A critical examination of his

work cannot fail to show the great part played by the daring and initiative of English captains and merchants. Far from home bases and having to contend not only with the hostility of the French, but with that of Dutchmen and Spaniards as well, these men, whose names are in many instances unknown, met adverse conditions with a determination to win. The whole struggle which ended in the capture of Gibraltar was economic. Its aim was to divert the trade of the East to British ports without the agency of foreign middlemen.

To the British exporter and importer the Mediterranean in the seventeenth century was the central section of one of the main roads of foreign traffic. A hundred years earlier the trade of the Levant, sorely hampered by the growth of Turkish power in Europe, had been deflected towards southern channels. The seaports of Asia Minor and of Syria nevertheless were the markets for a large part of western Asia's commerce with Europe. With the decline of Turkish naval power, it became easier for European traders to force an entrance into Turkish ports in spite of reluctant harbor masters. But as to the coincidence of British naval supremacy in the Mediterranean and the decline of the Turkish naval power the author makes no mention.

Neither does he mention the privileged status of European merchants in Turkey as soon as the régime of the Capitulations was inaugurated by French effort. A new era of prosperity was begun in the Levant by this diplomatic victory of the French, for it came at a time when the discovery of the sea route to India was leading to the abandonment of the older Levantine lanes of traffic. The British, on the whole, derived greater commercial benefit from the Capitulations than did the French.

The wealth of detail which makes up Mr. Corbett's historical study emphasizes the importance of the Mediterranean route. The great inland sea is the maritime highway which connects three old continents. And all the struggles between statesmen and soldiers recorded in these pages merely serve to show how much the mastery of this waterway was coveted.

SAFFORD, W. E. *Food plants and textiles of ancient America*. Ills. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 1, Section 1: Anthropology, pp. 146-159. Washington, D. C., 1917.

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AN EXPLORATION OF THE SIERRA DE PERIJÁ, VENEZUELA

By THEODOOR DE BOOY

[With separate map, Pl. XVII.*]

For many years it had been the ambition of the writer to explore the Sierra de Perijá, one of the little-known areas of South America. Two attractions beckoned towards the mountain range: the ethnological mystery that envelopes the Motilone Indians who inhabit the mountains, and the seant nature of the reports, often contradictory, relating to the geography of the region. Thanks to a grant made by the American Geographical Society of New York, it became possible for the writer during the past summer to undertake an expedition to the mountains. He sailed on May 1, 1918, for the city of Maracaibo in Venezuela, from which point he set out on his overland trip. In connection with the geographical reconnaissance, ethnological and archeological surveys of the region were made under the auspices of the University Museum of Philadelphia, and reports on these studies will appear in the *Journal* of that institution.

On arrival in Maracaibo the writer found that the credentials furnished him by the Venezuelan Government were in the custody of the administrator of customs of the port. By order of the Government the baggage of the expedition was to enter duty free, and, furthermore, the Minister of the Interior had dispatched a document in which the civil and military authorities of the districts that might be visited were called upon to render all aid and protection in their power. It is indeed a pleasure to work in a country where the Government encourages scientific research, and the writer's grateful thanks are due to the authorities in Caracas not only for the facilities extended, but also for the kind telegram of welcome from the Minister of the Exterior that was awaiting his arrival in Maracaibo.

* Pl. XVII will accompany an article by the same author in the next number of the *Review*. This article, which the map likewise illustrates, discusses the geographical features of the plain between Lake Maracaibo and the Sierra de Perijá.—EDIT. NOTE.

Thanks are furthermore due to the Caribbean Petroleum Company of Philadelphia for its kindness in allowing the expedition to make its headquarters in any of its drilling stations near the lower slopes of the Sierra de Perijá. The hospitality shown by this organization and the help rendered by its local representatives were of the greatest value to the undertaking. Finally, the writer is indebted to Señor Eleodoro García, a landowner of Machiques, for aid in introducing him to certain Tucueu Indians and for courtesies in many other matters.

State of Knowledge

NAME

The valley of the Magdalena River in the southern part of Colombia separates two spurs of the northern Andes, the Cordillera Central and the Cordillera Oriental (see inset, Pl. XVII). The latter runs along the eastern banks of the Magdalena to the northward, until at about 7° N. latitude it divides, one branch leading in a northeasterly direction and forming the Venezuelan Andes, the other continuing on towards the north. It is with this northern range that we are concerned. Its southernmost part is known as the Sierra de Ocaña and lies within Colombia. At about latitude 8° 30' the range begins to form the boundary between Venezuela and Colombia and continues to do this as far as its most northerly spurs, the Montes de Oca. On the Colombian side the Sierra de Ocaña obtains the name of the Sierra de los Motilones when the 10th degree of latitude is reached and from here on continues under the names of Sierra de Manaure, Sierra Montaña, Sierra Negra, and Sierra Colorada. On the Venezuelan side the range is called the Sierra de Perijá and retains this name as far north as the Montes de Oca.¹

TRANSMONTANE TRAILS

Since the Conquest the eastern slopes of the Sierra de Perijá have remained completely unexplored between the headwaters of the Palmar River to the north and the Rio de Oro to the south. Sievers,² one of the few contemporary geographers to discuss the Sierra de Perijá and an explorer who has done considerable work along its western (Colombian) slopes, states that "the eastern slopes of the Sierra de Perijá are covered from the

¹ On some of the older maps this range is shown as the "Sierra de Itoto," and this name is mentioned by Codazzi (Agustín Codazzi: *Resumen de la Geografía de Venezuela*, Paris, 1841, p. 455). It is likely that the name Itoto was derived from an Indian tribe formerly frequenting the eastern slopes. Sanchez (Silvestre Sanchez: *Geografía y Breve Historia de la Sección Zulia*, Caracas, 1883, p. 43) speaks of the "Sierra de Perijá, or Itotas," the different version of the Indian name probably being due to inadvertence, as this author is frequently inaccurate. The first known map of the Maracaibo region, that of Oviedo (Rudolph Sehuller: *The Date of Oviedo's Map of the Maracaibo Region*, *Geogr. Rev.*, Vol. 3, 1917, pp. 294-301) shows the Sierra de Perijá under the name "Siera (*sic*) de los Bubures," so named after the Bubures Indians, a subtribe of the Motilones. The writer can find no mention in any of the earlier or later historians explaining the origin or significance of the word "Perijá."

² Wilhelm Sievers: *Venezuela und die deutschen Interessen*, *Angewandte Geographie*, Ser. 1, Part III, Halle, 1903, p. 10.

foot to the top with dense woods, but are still totally unknown.” Both Simons and Sievers speak of a trail which at one time was used for travel between the Colombian village of El Molino and the Venezuelan town of Perijá, the latter settlement being more generally known under the name of La Villa. Simons³ states that “not many years ago a rugged footpath led across the high range of the Andes from Molino to Perijá in Venezuela,” while Sievers⁴ writes that “as late as the sixties a path existed from El Molino near Villa Nueva in the valley of the César which led to the lowlands of Lake Maracaibo at the Palmar River.” From numerous inquiries in the Perijá district, the writer learned that this path originally led along the Palmar River and followed the bed of the Rio Tosas (or of the Rio Lajas, our informants were not quite certain which), one of the tributaries of the Palmar, as far as its source, where a pass gave access to the western slopes of the range and a consequent descent into Colombian territory. This information was from traditional sources, as the oldest inhabitant could not positively state that the path had been used in his time. One account was current that an escaping Colombian malefactor had some ten years earlier succeeded in reaching Venezuela after incredible hardships by making use of the traces of the path which are still said to exist. It is likely, therefore, that the path was formerly used by both Venezuelans and Colombians and that attacks by the Cocina Indians, robber bands belonging to the Goajira Peninsula, or possibly by the even more dreaded Motilones, who in former days may have ranged farther to the north, were responsible for its abandonment. It is interesting to note that the ethnographic map in Codazzi’s “Atlas of Venezuela,”⁵ which indicates the routes of the earliest explorers of the northern part of the South American continent, shows the route taken by the German Alfinger on his journey from Venezuela to Colombia in 1531 to have led him over the mountains in the self-same locality, and it is well within the bounds of reason to suppose that in pre-Colombian days this pass was in general use by the Indians.

Sievers⁶ also mentions a second trail. “A second path led from the small settlement of Espíritu Santo . . . over the Sierra de Perijá to Venezuela.” It is probable that Sievers was misled by native accounts in Colombia regarding this means of reaching Venezuela. All inquiries in the Venezuelan town of Machiques, which about corresponds in latitude to Espíritu Santo in Colombia, failed to elicit any information regarding a path that in former years had led to the neighboring republic, and it is almost certain that, had such a path existed, the Venezuelans would have known of it. Furthermore, the Maeoa Indians inhabiting the interior of the Sierra de

³ F. A. A. Simons: On the Sierra Nevada of Santa Marta and Its Watershed, *Proc. Royal Geogr. Soc.*, Vol. 3, 1881, pp. 705-723, with map, 1:780,000; reference on p. 711.

⁴ Wilhelm Sievers: Die Sierra Nevada de Santa Marta und die Sierra de Perijá, *Zeitschr. der Gesell. für Erdkunde*, Vol. 23, 1888, pp. 1-158, with a geological and topographical map, each in 1:500,000; reference on p. 113.

⁵ Agustín Codazzi: Atlas físico y político de la República de Venezuela, Caracas, 1840.

⁶ Work cited in footnote 4, pp. 113-114.

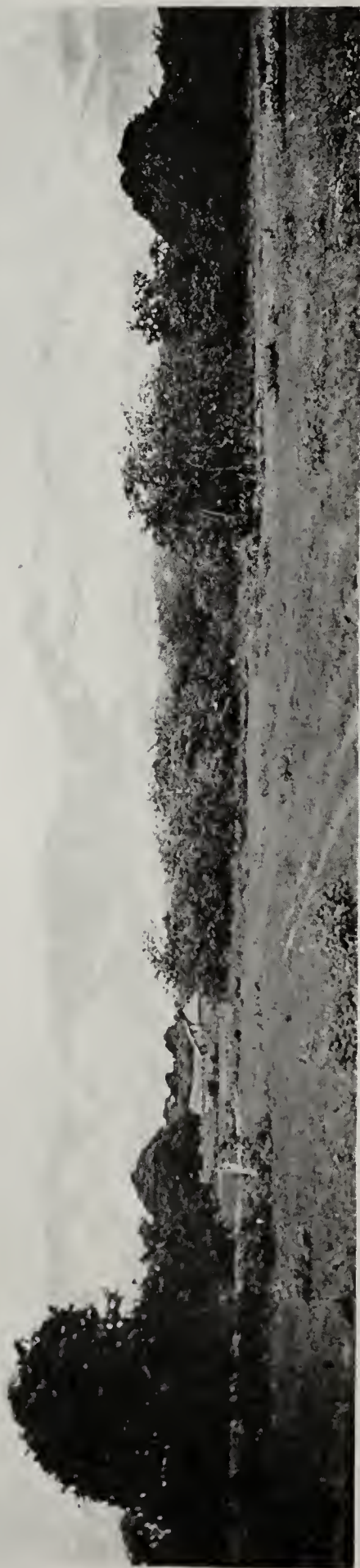


Fig. 1—General view of the Sierra de Perijá from high ground near La Villa.

Perijá were emphatic in declaring to the writer that they had, in their nomadic wanderings, never encountered the slightest trace of a former Spanish trail in the district where the headwaters of the Apon originate. The tribe had no legendary lore regarding such a trail, and from personal travel in the mountains over which such a trail would have led, the writer is positive that the hardships of the traverse, to say the least, would have rendered the journey from Colombia to Venezuela by this route impracticable.

LOCAL KNOWLEDGE OF THE RANGE

Except for the trail along the Palmar River, and the highly doubtful trail along the Apon, the Sierra de Perijá offers no facilities for travel and, as far as our knowledge goes, has not been ascended from the Venezuelan slopes by white men. It is probably for this reason that the Venezuelan population is today unacquainted with the range. The inhabitants of the region from the western shore of Lake Maracaibo to the foot of the mountains are not interested in the Sierra, as they find all the room they need for their farms and ranches in the lowlands; and the slopes of the mountains, while far more fertile than the savanas at their foot, are too precipitous to allow of ready cultivation. Furthermore, the Venezuelans stand in great dread of the Indians that live due west of the town of Machiques and even imagine the mountains to the northward peopled with Indians, although in fact there are none now living there. From the

headwaters of the Macoita River to the north as far as the Rio Lajas, the Sierra de Perijá is uninhabited, and it is not even certain that aborigines inhabit the region around the headwaters of the latter river.

The most modern map of the state of Zulia,⁷ while relatively accurate for the lowlands as far as roads, settlements, and rivers are concerned, depicts the Sierra de Perijá in what can be called an imaginative manner. The heights of many peaks are shown in the interior of the mountains, as are the headwaters of the Apon, Aponeito, Macoita, and other rivers. The location of the several Motilone tribes, such as the Macoita Indians, the Aponeito Indians, the Rio Negro Indians, and various others is also indicated. The writer is at a loss to account for these topographical details in a region that not only has been unvisited for the last hundred years, but that probably was never visited by any but Indians since the days of the Conquest. The inhabitants of Machiques can see the higher peaks of the Sierra de Perijá from their doors (for similar view from La Villa, see Fig. 1) but are of course unable to see the even more elevated peaks of the interior. Nor have they any knowledge of the headwaters of the above-mentioned rivers. The map, for instance, ignores the fact that the Macoita rises in the interior of the mountains and is much larger than the Aponeito, which originates near the western slopes of the second range due west from Machiques. The location of the Indian tribes is also entirely faulty and was probably derived from hearsay information from such Indians as at various times visited the cattle farms near the mountains.

INDIAN TRIBES

On the ethnographic map in Codazzi's "Atlas of Venezuela" the region under discussion is shown peopled by the Sabrites and the Guiriquires to the north of the Apon River and the Carates and Motilones to the south of this river. Codazzi indicates on this map that the Cocinas and Goajiras of the Goajira Peninsula are of the same stock as these tribes. The ethnological researches of the writer prove that the Motilones are of a different stock from the Goajiras and speak a language that is entirely different. It is of course not the purpose of this paper to go into a lengthy ethnological discussion of the tribes studied on the Sierra de Perijá expedition, but it may be said briefly that the Macoa Indians, among whom the writer took up his abode, belong to the Motilones and speak the same language as do the neighboring tribes to the south, the Tucucos, the Irapeños, the Chaparras, the Pariris, the Rio Negro, and the Rio Yasa Indians. Undoubtedly many other tribes exist as far south as the Catatumbo and Oro Rivers that belong to the same linguistic stock and have in the past been known under the generic term of Motilones. None of these tribes have names for themselves, the names used being derived from the streams whose headwaters they frequent. The word "Motilone" is unknown to them. According to

⁷ Estado Zulia, 1:500,000. In series: Atlas de Venezuela, Vicente Lecuna, edit. Caracas, 1916.



FIG. 2—The Sierra in the vicinity of the Macoa settlement. Note the scattered Macoa huts and clearings. The larger of the two huts on the slope on the right is the author's hut (see Figs. 4 and 5).

Fray Nicolas de la Rosa⁸ the word Motilone signifies "cut-haired," and this author gives a long and fanciful description of how the Indians came to adopt the custom of cutting their hair. This description is more ingenious than plausible, and it is more likely that the custom existed many centuries before the coming of the *conquistadores*. At any rate the practice is still followed today among the Maeoas by men, women, and children.

For centuries the Motilones have had a bad reputation, and it is probably for this reason that no expeditions have penetrated the eastern slopes of the Sierra de Perijá. For many years the western slopes have also remained unknown, although the Colombian Motilones have held a great deal more intercourse with the Spaniards than have their Venezuelan fellow-tribesmen. In 1915 a Swedish ethnologist⁹ collected certain data on the Colombian Motilones living in the lowlands below the Sierra de Perijá in the neighborhood of the former settlements of El Jobo and Palmira. The photographs made by this explorer of the Colombian Motilones bear a striking resemblance to those made of the Maeoas by the writer. All references in works treating of the ethnology of the Indians of the eastern slopes of the Sierra de Perijá agree as to the ferocity of the aborigines, and one early geographer¹⁰ goes so far as to put a terse notice on his map stating that the Motilones are "the worst Indians that exist." A modern ethnologist¹¹ in discussing the region says that "the mountain range west of Lake Maracaibo (Sierra de Perihá [*sic*]) is controlled by the wild and little-known Motilones." The few other authors who mention the Motilones speak in a like vein, and there appears to have been built up around this race a wall of superstitious dread that possibly may prove, ultimately, its strongest defense against the encroachments of its Venezuelan and Colombian neighbors.

Narrative of the Expedition

PREPARATION

The writer experienced considerable difficulty in obtaining servants to accompany his expedition once he left the petroleum station of La Horqueta, to which he had proceeded from Maracaibo after landing on Venezuelan soil. La Horqueta lies almost at the foot of the Sierra de Perijá. These mountains are not inhabited at that point, and information gained in the district indicated that it would be necessary to go to the town of Machiques before further information could be had on which to base an attempt to

⁸ Nicolas de la Rosa: *Floresta de la Santa Iglesia Catedral de la Ciudad de Santa Marta*, 1739. Reprinted at Valencia, 1833. Parts of this work have been translated by F. C. Nicholas: *The Aborigines of the Province of Santa Marta, Colombia*, *Amer. Anthropologist*, Vol. 3, N. S., 1901, pp. 606-649; reference on p. 624.

⁹ Gustaf Bolinder: *Det Tropiska Snö-fjällets Indianer*, Stockholm, 1916 (reviewed in this number of the *Review*).

¹⁰ Juan Lopez: *Carta plana de la provincia de Caracas ó Venezuela*, Madrid, 1787.

¹¹ H. J. Spinden: *Travel Notes in Western Venezuela*, *Amer. Museum Journ.*, Vol. 17, 1917, pp. 15-23; reference on p. 17.

enter the Indian territory. It was an easy task to obtain men to go to Machiques with the expedition, but it became another question when these men were asked to make an ascent of the mountain range. Despite the fact that Machiques lies within full view of the higher summits and that the town is watered by the Apon River, which breaks out of the range within a distance of not over ten miles from the settlement, the inhabitants are not only absolutely ignorant of the interior of the chain but are content to remain so. They were unanimous in stating that a visit to the region was an impossibility and would be accompanied by the gravest danger. In



FIG. 3—Ranges of the Sierra de Perijá seen from top of second range west of Machiques at an altitude of 2,800 feet. Note the dense forest cover of the range in the foreground, characteristic of the eastern border of the mountains in contrast with the interior (see Figs. 9 and 12).

consequence no peon could be found who was willing to undertake the trip with the writer, although, after his return from his visit to the interior of the mountains, there appeared to be a number of eager applicants for the next trip. The writer was informed in Machiques that a Señor Eleodoro García owned a considerable cattle farm at the foot of the mountains some ten miles due west from Machiques, on the Aponcito River. Señor García had also a residence in Machiques itself, and here I was so fortunate as to meet this gentleman. Señor García informed me that his ranch was frequently visited by some Tucueu Indians who lived among the Macoas in the interior; that these Tucueus worked on his property, felling trees and preparing the cleared land for pasturage; and that they did this work in exchange for ironmongery, which they afterwards carried to their mountain abodes and bartered with the Macoas.

As a result of this information a visit was paid to the cattle ranch, and it so happened that several of the Tucucús had just come from the mountains. A few of the Indians spoke Spanish, and, after the writer consulted with them, they undertook a special trip to their settlement to request permission from the Macoas for a stranger to visit their haunts. The Tucucús returned after four days with the information that the writer would be allowed to accompany them, but on the stipulation that he take not more than one companion.

Señor García was instrumental in procuring for me an excellent peon,



FIG. 4—View from a nearby elevation of the hut built for the author by the Macoa Indians.

Manuel Peñaranda, who was induced to go with the expedition to the Macoas. Peñaranda proved throughout my stay to be an excellent companion and one who was not easily daunted by the dangers that occasionally presented themselves. He was acquainted with some of the Tucucús through previous visits to Señor García's ranch, although he had, of course, never visited the interior of the mountains. Much credit is due to Señor García for having persuaded his *compadre* to accompany me and also to Peñaranda for having stood by me in what afterwards turned out to have been a rather hazardous undertaking.

It may be noted for the benefit of future explorers that there are but two means by which one can penetrate to the headwaters of the Apon and the Macoita Rivers. The first way would be to establish friendly relations with the Tucucús, as was done by the writer, and thus obtain permission to enter the Macoa territory. The Macoas are extremely jealous of their rights

of occupation and would resent by forcible means any intrusion of their haunts. Even if this first method were followed, it is not probable that the Maeoas would allow more than a party of three to penetrate the mountains, and they certainly would not allow any larger number to enter. The second way would be to go into the country without Tueuen guides, by taking a large body of men and cutting one's way in the desired direction. The



FIG. 5—The author's hut. Explorers' Club flag flying over hut.

result of this procedure would undoubtedly mean the loss of a number of followers through ambushes prepared by the Indians, and it is doubtful if one could do much without from fifty to a hundred guards. At any rate, it is certain that if an explorer went in with ten men or so, without the sanction of the Indians, the expedition would be foredoomed to massacre.

By the time the Tucucus returned, the writer had collected his baggage at Machiques and also had laid in a supply of trading goods for the Indians. These loads were distributed among the men, who appeared to feel no discomfort in carrying weights up to 120 pounds. They arranged on their backs the bags

in which our belongings were stowed and helped support them by a woven cord fastened over their foreheads; in this manner they climbed steep places which personally I had difficulty in ascending without any load at all.

THE JOURNEY TO THE MACOA SETTLEMENT

Leaving Señor García's ranch on June 2, we followed the trail to the Maeoa country. First it leads along the banks of the Aponeito River (for route, see Pl. XVII). There is of course nothing but the most elementary path, as the Indians of the Sierra de Perijá are in constant dread of attacks from other Indian tribes and attempt to hide their trails as much as possible. Frequently there was no path at all, and one simply jumped from rock to rock in the river bed or else had to wade. After some three hours, the trail left the Aponeito and led through the denser forest of a precipitous mountain slope (see Fig. 3). It would be impossible to describe the diffi-

culties of this journey. The Tucucú appeared to be used to it; but with the almost perpendicular ascents, the wet ground which caused constant slipping, and the dense vegetation, the writer suffered considerably. At an altitude of 4,800 feet a pass was reached which permitted descent into the ravine separating the first and the second mountain range. This descent proved even harder than the ascent, and it was not unusual to encounter a perpendicular cliff where one had to descend by means of *bejucos*, the parasitic creepers hanging from trees. Camp was made the first afternoon at an altitude of 4,400 feet, on the slope of the second mountain. The making of camp simply entailed cutting some sticks and thatching these sticks with large leaves. The baggage was spread in a dry place, and the party slept on the ground.

The next morning the journey was continued, and about noon, after having ascended the second mountain and descended to a larger valley in a northwesterly direction, we came to the confines of the Macoa country. Up to now no cleared ground had been visible, but after reaching the summit of the second range we could distinguish the agricultural clearings of the Macoas by their different shade of green. At length the first Macoa hut came in sight, and our Tucucú gave notice of the approach of the expedition by prolonged shouts from the hilltop. On reaching the outskirts of the Macoa settlement, I gained my first view of the Indians in their native land. The average altitude here was 3,600 feet.

The settlement consists of some fourteen huts spread over contiguous hilltops. No two huts are placed side by side and the Indians apparently are not of a congenial disposition. Perhaps the explanation of the widespread Macoa village is that in the event of raids from hostile tribes, there is a better chance of escape for some of the members of the community. Nevertheless, the arrangement is inconvenient in the extreme, as a visit from one hut to another frequently means a steep descent and then a steep ascent, while actually the huts are so near together in an air line that their occupants can converse from one to another without great difficulty. The Macoas also have their clearings at considerable distances from their huts, but why this is so the writer cannot tell. Frequently the hillsides directly under their huts are not cleared, and the Macoa undertakes a walk of an hour or more before he reaches his agricultural patch on a distant hill. Yet the first hill slope would be equally well suited for cultivation. (For general view, see Fig. 2.)

The greeting accorded me by the Macoas was quite friendly, and I appeared to be as much of a curiosity to them as they were to me. Their first act consisted in building me a large hut some 24 feet long and 14 feet wide (Figs. 4 and 5). This hut was far larger than their own huts. The Macoa men have an average height of a little over 5 feet 1 inch and the Macoa women a height of almost 4 feet 9 inches, and the aborigines evidently reasoned that the tall stranger needed a good deal of room. The building

of the hut took about a day and a half and was undertaken by practically all the male members of the community. All work was done in the most willing spirit, and seldom during my stay did any Indian show unwillingness to grant any request I might make. Food was brought to my hut daily and in enormous quantities. The Tucucús had at various times brought chickens from the lowlands to the Macoa settlement, and no day passed without their bringing in numerous chickens and eggs. Furthermore the supplies of yams, bananas, plantains, corn, sweet potatoes, and yucca given me far exceeded my necessities, and of the game killed a generous share was always reserved for my use.

ETHNIC STATUS OF THE MACOAS

Outside of the ethnological work undertaken for the University Museum of Philadelphia, the object of my stay among the Macoas was the exploration of the headwaters of the Macoita and the Apon Rivers and the possible undertaking of a journey to the west in order to reach the Colombian side of the mountains. As far as the ethnological work and the exploration of the headwaters of the Macoita were concerned, the expedition was successful. The headwaters of the Apon were not reached, nor did I succeed in crossing the last mountain chain dividing the valley of the Apon from the Colombian lowlands. The Macoa Indians were studied and photographed, and a vocabulary of their language was compiled with the aid of Tueuen interpreters. Reports on this work are to appear in the *Museum Journal*. Briefly, it may be said that the Macoas and Tucucús proved to have habits that differed greatly from those of the Goajiras to the north and the Arhuacos to the west. Unlike these tribes, the male Indians of the interior of the Sierra de Perijá do all the agricultural work, while the women do the weaving. The opposite is the case with the Goajiras and the Arhuacos. The feasts, ceremonies at birth and marriage and death, hunting customs, and games are also quite different. Perhaps the greatest distinction lies in the apparel, both male and female Macoas wearing heavy cotton robes, which are never discarded by the men and the upper part of which only is discarded by the women during the warmer hours of the day. For these practices the climate is of course the chief reason, heavy clothing being needed as a protection against the mists and the cold of the interior of the Sierra de Perijá. Furthermore, the Macoas are also one of the few tribes of northern South America who do not use the hammock. They sleep on woven grass mats.

DISCOVERY OF WATERFALLS

The Macoa settlement lies within a few miles of the two principal tributaries that go to make up the headwaters of the Macoita River. It was on these two tributaries and on the Macoita River itself that I was fortunate enough to discover a series of waterfalls which had hitherto not been seen



FIG 6—Upper Bolívar Falls, right fork of the Macoita River: upper and middle cascades, respectively 100 and 200 feet high.

by any but the aborigines of the region. Their discovery came about in this manner. The second evening we passed among the Macoas happened to be a very still night with almost no wind, and I noted at intervals a subdued roar that appeared to proceed from some distant spot. Upon inquiry what this could be, the Indians repeatedly made use of the expression *kúna-torótpok*. The Tucucús appeared to be unable to inform me of the Spanish equivalent for these words. The following day, one of the Indian children happened to fall and set up a loud wail, and I noted that its mother, in speaking of the occurrence, frequently employed the word *torótpok*. The same day also, when I began compiling a vocabulary, I was informed that *kúna* meant water, and after this it needed no great amount of perspicacity to decide that *kúna-torótpok* meant waterfall. This solved the origin of the mysterious sounds. I determined to visit these falls at once and gave the Indians no rest until they agreed to guide me to them. In all, six waterfalls were visited and surveyed, an undertaking which took three weeks. Large wooded areas had to be felled occasionally in order to obtain proper light in the deeper canyons for taking photographs. The cutting of trails to the falls was also a laborious piece of work.

Three of the falls occur on the right, or western, tributary, two on the left, or eastern, and the sixth just below the junction of the two, on the Macoita proper (see inset on Pl. XVII). The writer would suggest naming the falls on the right fork Upper, Middle, and Lower Bolívar Falls, in honor of Simón Bolívar, the liberator of Venezuela and founder of five South American republics; the falls on the left

(The figure of the Macoa Indian at the bottom cannot serve as a scale because of the different angles from which the component parts of this view are seen.)

fork, Upper and Lower Arismendi Falls, after Doña Luisa Cáceres de Arismendi, the heroine of the Venezuelan War of Independence, whose history has been related elsewhere by the writer;¹² and the falls on the Macoita

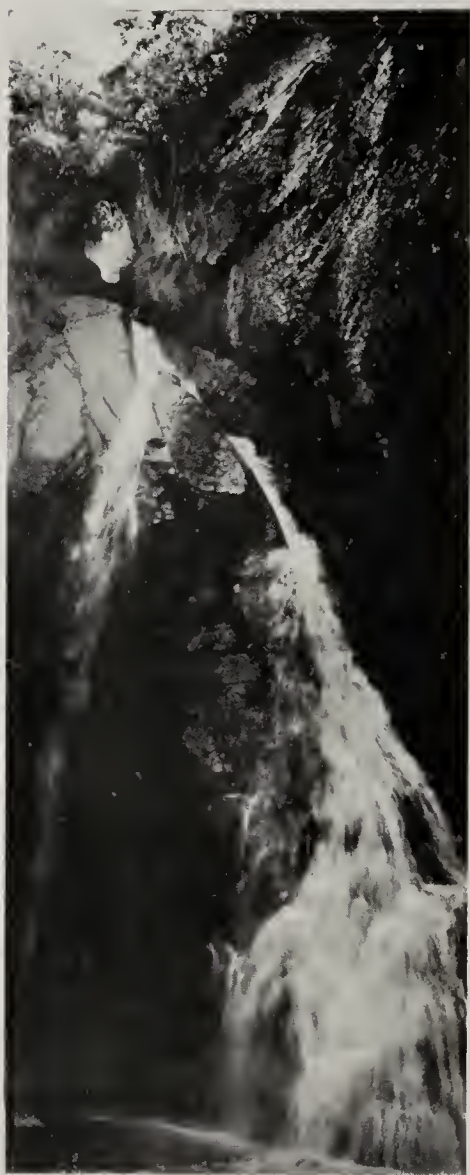


FIG. 7—Upper Arismendi Falls on the left fork of the Macoita River: lower and upper cascades, respectively 70 and 80 feet high. Note the natural stone arch at the top through which the upper cascade plunges.

River itself, Venezuela Falls. The writer would feel honored if these names should meet with the approval of the Venezuelan Government, to which he is indebted for such numerous courtesies and so much good will.

The Upper Bolívar Falls consist of a series of three cascades, respectively from highest to lowest about 100, 200, and 45 feet high, the altitude at the bottom of the lowest fall being 3,740 feet. The uppermost and middle falls are of comparatively small volume but their picturesque beauty is indescribable (Fig. 6). The lowest fall owes its impressiveness to its greater volume of water. About three-quarters of a mile in an air line downstream below the lowest of the Upper Bolívar Falls lie the Middle Bolívar Falls. Their height is about 40 feet and elevation at bottom 3,400 feet. At a considerable distance farther downstream lie the Lower Bolívar Falls, consisting, like the upper falls, of three cascades. These are respectively 80, 60, and 40 feet high. The altitude at the bottom of these falls is 3,000 feet.

Of the falls on the eastern tributary the Upper Arismendi Falls consist of two cascades 80 and about 70 feet high. The elevation at the top of the first is 3,400 feet, at the bottom of the second, 3,250 feet. The pool at the foot of the first cascade is spanned by a natural stone arch about 120 feet across, which serves as a charming frame for the upper part of the falls and the tropical vegetation that can be seen through its opening (Fig. 7). The Lower Arismendi Falls lie about half a mile south in an air line. The altitude at the top is 3,050 feet. The fall descends about 80 feet and then rushes through a ravine about 300 feet long.

The two tributaries now join and go to make up the Macoita River.

¹² Theodoor de Booy: Island of Margarita, Venezuela, *Bull. Pan Amer. Union*, Vol. 42, 1916, pp. 531-546: *id.*, La Isla de Margarita, Venezuela, *Bol. Unión Pan Americana*, Vol. 43, 1916, pp. 32-45.

From a pool at an altitude of 2,950 feet which is fed by the two tributaries descend the Venezuela Falls (Fig. 8). They consist of three cascades, 80, 60, and 15 feet high. The altitude at the foot of the lowest fall is 2,750 feet.

While our stay in the Macoa region was during the rainy season, it should be stated that the photographs of all the falls described were taken after fairly dry spells and that the Tucucu Indians informed us that at the height of the rainy season a far larger volume of water passes over them.



FIG. 8—Venezuela Falls, at the junction of the right and left forks of the Macoita River: middle and lower cascades, respectively 60 and 15 feet high.

Evidence of this could be seen on the rocks above each fall, which were waterworn above the level of the water at the time of our visit. The Indians also informed us that the falls never went dry and that in fact they seldom had less water than at the time the photographs were taken, probably because prolonged droughts are unknown in the interior of the Sierra de Perijá.

OTHER WATERFALLS

According to our Indian informants, the Macoita River has still another waterfall before it breaks its way through to the lowlands. The Indians, however, declared that the trail to the top of this fall was absolutely impassable during the rainy season and that even in the dry season there is no possibility of descending to the bottom of the cascade. They also de-

clared that this fall was higher than those visited by the writer. Owing to the precipitous formation of the easterly slopes of the Sierra de Perijá, it is likely that almost every river originating in the interior of these mountains has falls. The Indians informed us that the Apon River has a fall of considerable height below the place where we actually struck this stream in our journey westwards. Furthermore, the Cogollo River to the northward has a number of falls, three of which were visited by the writer during his stay at La Horqueta, previous to his journey to Machiques and his sojourn among the Macoas. While the Cogollo falls are nearer the extreme eastern slopes of the range and are not so high as the falls of the Macoita, they are very similar. The Cogollo falls are reached by following the bed of the river from the place where it breaks through the mountains. They have on two occasions been visited by geologists of the Caribbean Petroleum Company. The highest of the falls was not seen by the writer. He made the trip accompanied by a peon who was unfamiliar with the terrain and who in consequence guided him up the southern branch of the river where he should have followed the northern branch from the fork at an altitude of 1,600 feet. The falls visited by the writer had a height of 15 and 30 feet respectively and were located at an altitude of 1,700 feet. The higher falls on the northern branch of the Cogollo are reported to have a height of about 150 feet but contain a far smaller volume of water than those of the southern branch. They are distinctly visible from the lowlands and make a picturesque strip of white against the vivid green background of the woods that cover the Sierra de Perijá.

TRIP TOWARD THE WESTERN BORDER OF THE RANGE

After having been with the Macoas about three weeks, the writer decided to make an attempt to proceed in a due westerly direction with the object of reaching the last chain of mountains dividing Venezuela from Colombia and of descending to the Colombian plains. When the subject was first broached to the Macoas and Tueucus, the Indians appeared to be very reluctant to take part in this undertaking. They said they were unacquainted with the mountains that lay more than a day's journey to the west. Furthermore, the journey would lead fairly close to the headwaters of the Rio Negro, the next major eastward-flowing river south of the Apon, where was settled a tribe with which the Macoas had been at war for a long period. On previous occasions, when a punitive expedition was organized by the Macoas for the chastisement of the Rio Negro Indians, a circuitous route was taken along the easterly slopes of the Sierra de Perijá to the south before striking west to reach the Rio Negro settlement; but the Macoas were uncertain whether the Rio Negro Indians were not in the habit of frequenting the regions we proposed to visit. It may incidentally be stated that, less than a generation ago, the Rio Negro and the Macoa tribes were all one tribe and that at a feast a dispute between a chief and another

Indian resulted in a general fight in which many Indians were killed. The two factions then went their respective ways and since that time have waged deadly warfare the one against the other. One Macoa showed the writer two scarcely healed arrow wounds received only about three months before in a fight with Rio Negro Indians.

The proposed expedition caused a great deal of perturbation among the Indians, and it was not until after a generous offer had been made of many beads and much ironmongery that the writer could prevail upon two Tucucos and two Macoas to take part in it. One of the Tucucos stated that his father had told him of an expedition he had made toward the west many years ago, and that on this expedition the members of the party had found an immense cave in a curiously shaped mountain peak. This cave was filled with large funeral urns (the Tucucu called them earthenware pots, filled with bones). It was probably similar to the cave found by Crevaux on the island of Cucurital in the Orinoco River near Atures.¹³ As the present-day Motilones are in the habit of tying up the bones of their dead in sleeping-mats and subsequently depositing these bundles in rock shelters, it would appear as if the interior of the Sierra de Perijá was at one time inhabited by a different race. Archeological evidence in support of this theory was also found by the writer.

DIFFICULTIES OF TRAVEL

Leaving Peñaranda in camp, the writer started on June 25 with his four Indians. The first day's journey (for route, see Pl. XVII) led towards the summit of a peak due west from the camp. This trail had frequently been used by the Indians, and we were going over what to them was familiar ground. The peak had an altitude of 5,500 feet. After descending to a brook, tributary to the Bolívar fork of the Macoa, we spent the afternoon in crossing the southern ridge of this mountain, reaching an elevation of 5,250 feet, and then pitching camp for the night on the slope beyond at an altitude of 4,700 feet. The mountain traversed was densely wooded and had been partially cleared on its eastern slope by the Macoas some years previously, when some of the Indians had grown corn and other vegetables in this locality. Only very little game was seen on this first day, the total bag consisting of a toucan and a partridge, both being eaten that night by the Indians. While the writer had already come to know the intense cold of the Sierra de Perijá, it was in this camp that he first learned how much one can suffer from cold even in a tropical country. The mists which cover the mountain tops in the afternoon are not conducive to warm nights, and when one travels on such a journey as this, where every ounce of extra weight means retarded progress, one learns the intense discomfort of sleeping on boughs and leaves spread on the ground without even a single blanket for covering.

¹³ Jules Crevaux: *Voyages dans l'Amérique du Sud*, Paris, 1883; description of burial cave on p. 561, illustrated on p. 563.

The following day our party passed the last landmark with which the Indians were familiar. We now proceeded in a northwesterly direction along a ridge connecting the elevation we had rounded with a higher summit farther on. It may be said here that travel with the Maeoas and Tuencus was irritating in the extreme. It was not unwillingness on their part, but simply what one might term lack of concentration on the desired objective, which at times caused the writer great annoyance. The slightest reason, such as the sight of animal trails or supplies of bamboo from which arrow shafts could be made, caused the Indians to forget for the moment the object of the journey and to waste valuable time in other pursuits.

LACK OF GAME

On the second day, as we followed the mountain ridge in a northwesterly direction, it was noted that the summits of many of the spurs of this ridge were covered with large ferns which made an almost impenetrable thicket. Had the trip taken place in the dry season, these ferns could easily have been burned. As it was, the constant drizzle had made them so wet that our party was forced laboriously to carve its way through the tangle with cutlasses. The crests of the spurs were not covered with the deep soil that formed the basis for the heavier vegetation of the lower slopes. The summits of the mountains appeared to be formed of a soft volcanic rock in which were imbedded many granite boulders. Larger trees were but seldom found, and shrubs, together with giant ferns and wiry grasses, took their place. It was in these regions that the writer began to note the absolute lack of game which afterwards proved so disastrous to the undertaking. With the exception of hawks and eagles, birds were no longer seen. On the other hand, bear tracks were plentiful; and several of the larger trees showed numerous claw marks of this animal. During the entire journey, however, we did not have the good fortune to see one of these animals. Had we seen one, a plentiful supply of meat might have been secured and the expedition brought to a successful termination. It is probable that these tracks belonged to the "speetaeled" bear, as our Indians told us the animal's pelt was black, but that its face was covered with white hair.

Owing to the undergrowth, our progress was but slow on the second day, and we finally camped at an altitude of 5,100 feet amid the ferns. By this time the food supplies brought from the Maeoa settlement were getting low, one reason for this being the Indian habit of gorging when there is food and fasting when there is none. But while the Indians showed remarkable ability in gorging, they subsequently did not show any of the fabled endurance in fasting. When we broke camp on the morning of the third day, the writer insisted upon leaving a fair amount of yucca and plantains in a cache, to serve for the return journey. This left loads for but two of the Indians, the other two remaining free to proceed ahead and cut a way through the fern thickets. Our progress in consequence became

somewhat faster. We continued on the ridge to an elevation of 5,400 feet, where our progress was barred by a westward-facing precipice. Skirting this to the south, we then struck off in a westerly direction and at noon had climbed to an altitude of 6,000 feet, the highest elevation reached on the trip. To the west and to the north we could plainly perceive peaks that were far higher than the summit of the mountain we were on. It is in fact highly doubtful if the highest elevation at present stated for the Sierra de Perijá—the Cerro Pintado, by Sievers, who claims¹⁴ from 2,800 to 3,000 meters for this peak on the western edge of the range in 10° 25' N.—is not



FIG. 9—Looking east along savana-covered ridge at point from which westward view, Fig. 12, was taken. Altitude 2,500 feet.

considerably lower than some of the peaks seen by the writer in the interior of the Sierra. He estimated several to have heights of at least 11,000 feet.

NERVOUSNESS OF THE INDIANS

The afternoon of the third day our path led northwest along a ridge with a serrated crest line which was still covered with ferns and the smaller, tangled undergrowth. In the late afternoon the ridge made a steep descent, and we once again reached heavy forests, whose trees consisted largely of the valuable cedar. The Indians had been palpably nervous all day, fearing possible encounter with members of hostile tribes, and this nervousness increased on entering woods where the high vegetation did not allow frequent climbing of trees to make observations. During the entire trip, however, no sign was seen of other Indians, nor were new clearings found to indicate agricultural activities on the part of other tribes. We camped in

¹⁴ Work cited in footnote 2, p. 10.

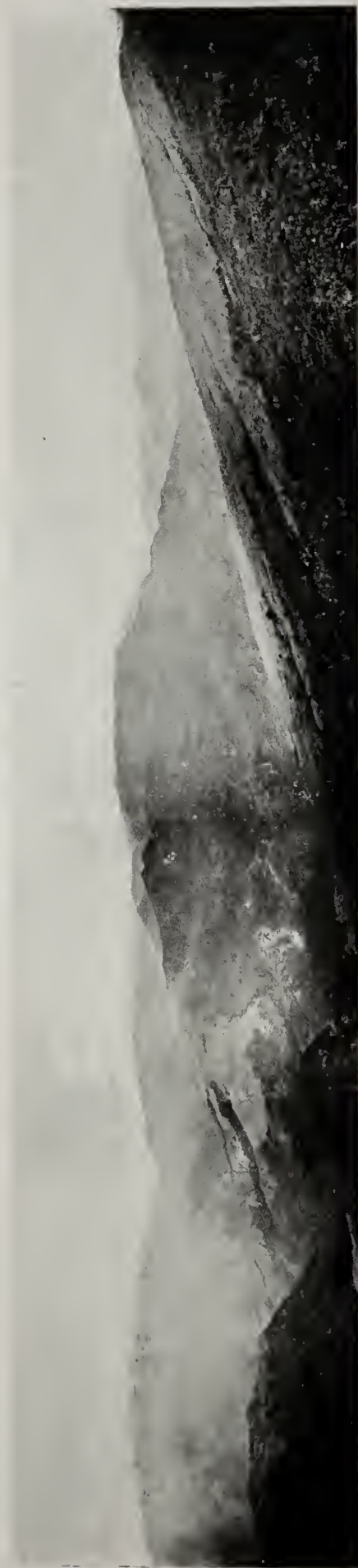


FIG. 10.



THE GEOGR. REVIEW, NOV. 1918

FIG. 11.

FIG. 10—Panoramic view, taken from an altitude of 4,100 feet and looking from west via southwest to south-southwest, of the Sierra de l'eriñá beyond the longitudinal course of the Apon River. The valley of the Apon lies in the middle distance. The farthest visible crest is in all probability on the westernmost range and overlooks the Colombian lowlands of the César valley.

FIG. 11—Outline sketch of panorama above to serve as key where the photograph is indistinct.

the woods that night at an altitude of 5,400 feet, and the entire party suffered intensely from the cold. The suffering furthermore was aggravated by a lack of food and a steady drizzle which continued through the night. The writer attempted to persuade his carriers to build a fire; but, owing to the Indians' fear of drawing the attention of other aborigines that might be about, the suggestion met with no response.

On the morning of the fourth day the writer noticed a great lack of enthusiasm in his Indians about continuing the journey. Of the party the two Tueueus appeared to be rather the more willing, but even they cast many a longing glance to the eastward. By this time the stock of food on hand was remarkable only for its lack of weight; and, as the writer insisted that half be left behind in order that there might be something for the return journey, the carrying of the remainder was no great hardship on two of the four bearers. After breaking camp our trail led us steadily downward in a southwesterly direction until about noon. Progress again became slow, as precipitous rocks had to be circumvented. At times we had glimpses of a mountain directly to the west whose altitude could not be less than 8,000 feet, while the mountains due north, with possible altitudes of 11,000 feet, also frequently became visible from points where the vegetation on our ridge was low enough to give an outlook.

VALLEY OF THE APON

At about noon, when we had descended to an altitude of 4,800 feet, we left the woods and entered upon the ridge of a wide-flung mountain spur which was covered with wiry savana grass (Fig. 9). The view obtained after our party emerged from the woods was magnificent. To the west and southwest one could see the cloud-capped mountain ranges which undoubtedly form the last chain that separates Venezuela from Colombia (Figs. 10 and 11). An extensive valley, running north and south, spread out below, the grass-covered slopes leading down to the Apon River, whose course was marked by a belt of dense woods. The river apparently originates on a mountain forming the northern barrier of the valley and flows due south until it bends east to seek an outlet to the lowlands. The southern barrier also is composed of a wide mountain. The valley has an area of possibly as much as 80 square miles, its length being not less than 10 miles and its width in places as much as 8 miles. On the slope of the high mountains beyond the Apon yellowish-green patches indicating savana interrupted the darker green areas of forest, which extended to the crests (Fig. 12). Apparently only the exposed ridges of the spurs are covered with grass while the more protected slopes are wooded. According to the Tueueu whose father had visited this region many years before, the Indian name for the savana-covered slopes leading west and east down to the Apon River was "Manatara" and that of the river itself, "Yapon." He also stated that the Rio Negro was called the

“Atapshi” and the great river to the south (the Catatumbo), the “Shukumu.” It was possible to see, here and there in the wooded regions of the slopes of the last mountain chain, evidence of former clearings. To an archeologist, accustomed to work in the tropics, these signs are unmistakable. A cleared area, even one dating from pre-Colombian days, never grows up in such a manner as to blend absolutely with the virgin forest.

The afternoon of the fourth day we continued along the sharp ridge, steadily descending. While at first walking through the grass was a welcome relief from the everlasting cutting of undergrowth in the woods, the pebbly, hard ground which characterizes the savana-covered areas owing to their thinner soil covering soon caused intense suffering to our unaccustomed feet. In the late afternoon camp was made on the southern slope of the ridge near a spring that was found in a small wooded patch at an altitude of 4,000 feet (Fig. 13). The noon meal had practically exhausted our food supply, and it was only after a heated argument in the evening that the writer was able to persuade his companions to proceed at least half a day’s journey farther to the Apon River.

VAIN HUNT ON THE BANKS OF THE APON

It was the writer’s idea that perhaps the woods bordering this stream might contain game, and the shooting of a bird of any kind or of a monkey would save the day and encourage the Indians to continue the trip up the last mountain chain separating us from our objective. Incidentally, the Tueueu whose father had told him the story of the burial cave and had given him minute particulars of the peculiarly shaped peak in which the cave was to be found, had recognized this mountain on the slopes of the last chain and had pointed it out to the writer.

The next morning, which made the fifth day after leaving the Macoa settlement, we continued our journey on empty stomachs, our breakfast having consisted merely of tea, which offered but scant consolation to the Indians and did not serve effectively to still the writer’s pangs of hunger. We proceeded along the ridge and at last, from an altitude of 2,700 feet, could clearly see the course of the Apon River (Fig. 15). The woods bordering the banks of this stream made us hopeful of game, and the rest of the morning was spent in a wild scurry down the slope in order to realize our hopes. At last we reached the river at an altitude of 2,200 feet, considerably lower than the Macoa settlement. At this elevation the Apon is already a wide stream with a considerable amount of water (Fig. 14). Its width is not less than fifty feet, and the velocity of the current perhaps as much as ten miles per hour. The depth in places is five feet or more and is nowhere less than three feet.

TURNED BACK BY HUNGER

The remainder of the day was spent in a futile attempt to find a victim for the writer’s gun or the Indians’ arrows. One solitary curassow was

flushed but did not allow us to come within gunshot afterwards, and with this exception no animal was seen. The Indians managed to secure some, to us, unknown roots, which they ate with no apparent relish. Fish were seen in the river, but all attempts to catch them without hooks proved vain.



FIG. 12—A detail of the slopes of the mountains west of the Apon, seen closer by than on Fig. 10. Note the distribution of forest and savana. Two Indians on the ridge in the middle distance. Taken from an altitude of about 2,500 feet.

The writer even tried to shoot some of them but met with no success. In the late afternoon the Indians became positively sullen and proposed returning to the camp. This time there was no argument on the part of the writer, as in the first place he did not believe that a continuance of the trip would mean the finding of food on the slopes west of the Apon, and in the second place he considered the two Macoas in no mood for argument.

We therefore returned and reached our camp of the previous night at

about ten o'clock, having had to make the latter part of the trip by moonlight owing to the time we lost in our fruitless hunt on the banks of the Apon. The pangs of hunger that night were especially severe, and the grumbling on the part of the Indians was only rivaled by the unexpressed thoughts of the writer. To have actually seen the last mountain chain separating him from his goal and not to have been able to continue was a trial that far exceeded in agony the pangs of hunger. It was only aggravated by thoughts of the burial cave in the curiously shaped peak where untold archeological treasures of the Arhuacos may be awaiting a discoverer.



FIG. 13—Camp on the southern slope of the ridge shown in Figs. 9 and 12. Altitude 4,000 feet. The first and third Indians from the left are Tucucús; the second and fourth, Macoas. The cotton robe worn by the two standing Indians is the characteristic garment of the Macoas—a response to the mists and cold of the interior of the Sierra.

KILLING A MONKEY

The sixth day found us struggling up the slopes and saw us finally reach our next camp in the late afternoon, at an altitude of 5,400 feet. Here we found that a large part of the food that had been left behind had spoiled. We finished the remainder that night, the Indians even eating the skins of the plantains. An early start was made the next morning, and almost before the sun was visible we ran into a party of howling monkeys, one of which the writer succeeded in shooting. This was his first experience in killing a monkey, and he sincerely hopes it may be his last. The dying

agonies of the wounded animal, regarded with stoical indifference by the Indians, will long remain in the writer's memory. Hungry as I was, the meal that was prepared almost directly after the animal's death had no attraction for me. In fact I was obliged to leave the Indians for a while until their repast was finished. Even the thought that I had shot the monkey under circumstances of great stress failed to console me. I believe that this remorse is experienced by the majority of tropical explorers who have at times been obliged to kill monkeys in order to ward off the dangers of starvation. The Indians, on the other hand, appeared to have none of



FIG. 14—The Apon River: looking downstream. The river here lies at an elevation of 2,200 feet

these feelings and made a hearty meal, with a consequent revival of their good humor. That night we reached our camp at an altitude of 5,100 feet, having traveled the entire afternoon in a steady downpour. In this camp we found the first cache of food we had made; this, together with the remainder of the monkey, was eaten by the Indians.

The seventh day found us once again cutting a way through the ferns, and early that afternoon, thanks to the quicker progress made over the path cleared five days previous, we reached our first camp at an altitude of 4,700 feet. As it was quite early, we decided to continue along the trail. The traveling was now all downhill and easy going, as the trail had frequently been used by the Macoa settlement. Incidentally we were again suffering from hunger, as no more game had been seen after we met the

monkeys, and no food had been left in the first camp. Our start the next morning was therefore made very early, and before eight o'clock in the forenoon of July 2 we reached the Macoa settlement, where plentiful food had been prepared by Peñaranda upon hearing the writer's warning shots from a nearby hilltop.

RETURN TO THE LOWLANDS

A few days after arriving, the writer decided to bid farewell to the Macoas and Tucucús and to return to the plains. The return journey down



FIG. 15—Looking down upon the Apon River from an altitude of 2,700 feet on the ridge shown in Fig. 12. The woods occur only immediately along the stream; above, the slopes are grass-covered, as in the right background.

the mountains took less time than the ascent; and, when we finally emerged at the cattle farm of Señor García, I had covered in ten hours what previously had taken two days. I was, in many ways, regretful at leaving the Macoas, who had treated me so well; and I believe that several of my kindly hosts were sorry to see me go. Not all the Macoas had remained friendly, however, and in some ways I felt that there was a possibility of imminent trouble had we remained much longer. The novelty had worn off, and several of the Indians had become dissatisfied when the stock of trading goods was exhausted. Besides, it is simply natural for the Macoa to get into a fight every little while, a propensity of which I saw plentiful evidence during two

chicha feasts that were held during my stay in the mountains. I was not desirous of being a party to one of these fights and losing the linguistic, ethnological, and geographical data I had been able to collect.

There are great possibilities in the Sierra de Perijá for future exploration. A prolonged sojourn among the Macoas, with a plentiful amount of trading goods and canned food, would allow for many journeys through the interior of the Sierra and for the mapping of the headwaters of many of the rivers that go to make up the western tributaries of Lake Maracaibo. That the American Geographical Society enabled the writer to lift, be it ever so slightly, the veil of mystery which now hangs over this chain, means to him a debt of gratitude which his mere words cannot sufficiently express.

THE ORIGIN AND MAINTENANCE OF DIVERSITY IN MAN

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PURPOSE OF THIS PAPER

Last year the writer, in a paper¹ read before the Royal Geographical Society of London, attempted to prove that [racial characters in man have been, for a very prolonged period, of progressively diminishing importance.] The same paper sought to outline some of the environmental conditions which favor the development of a stable nationality.

I have since been following out a similar train of thought in a book which strives to show that, essentially, the world war is the result of an attempt to impose upon man the uniformity of advanced industrialism, this involving, in the long run, the suppression of nationality, as of all other forms of human diversity and individuality. That attempt, when made with the help of one of the most powerful military organizations known in history, aroused all but world-wide instinctive opposition—an opposition which, previously, while efforts in this direction were being made chiefly by more or less isolated groups, had been felt and expressed only by individuals.

To me it seems that the instinctive revolt just mentioned may be said to have its deeper sources in that tendency to variation which appears to be inherent in all living things. From the outbreak of the war public men everywhere have tried to find a suitable formula to express their individual repulsion to the forcible standardization of the world, an attempt which has not, as yet, met with a full measure of success. But if the origin of that repulsion is what has just been suggested, it ought to be the special task of the geographer to find for it an adequate expression.

For note that, by definition, the geographer is concerned with the interaction between man and his environment, both physical and organic. Now it is a simple fact of observation that the physical environment is markedly diverse on different parts of the earth's surface. Most of those who have thought about the problem in any detail are agreed that the almost infinite diversity of organic life is, in essence, a reflection of the diversity of the physical conditions. Among biologists, also, there is a large measure of agreement as to the mechanism by which the organism is able to make an adaptive response to a diverse and changing environment. Most biologists are agreed further that the existing variety of plants and animals is not only an adaptive response to the diversity of surface relief, climate, and other factors which exists on the earth, but that since we know that these

¹ M. I. Newbigin: Race and Nationality, *Geogr. Journ.*, Vol. 50, 1917, pp. 313-335 (discussion, pp. 328-335).

conditions are changing, continuously if slowly, the persistence of stocks depends upon the retention of this power of adaptation. In other words, they hold that, if organisms generally are to survive, they must not only be diverse, but the mechanism by which that diversity is produced and maintained must continue to act.

Now the concept which is implicit in the attempt to complete the industrialization of the world involves, in the case of man, both an attempt to deny that human environment is under modern conditions diverse and an effort to interfere with the mechanism by which human adaptive diversity originates and is preserved.

Surely, then, here is a direct challenge to the geographer, and that from two sides. It is for him an axiom that the world is not uniform but diverse, and the complex interrelations between the diverse environments and the different types of human societies are his special field of study.

Hitherto, influenced no doubt by the enormous stimulus to his science which came from the development of biological theory during the latter part of the nineteenth century, he has shown too great a tendency to accept from the biologists the view that the mechanism which produces and maintains diversity acts in the case of man in an almost similar fashion to that in which it acts in the case of other organisms. That position should, to my mind, be abandoned as untenable, and he should respond to the challenge of industrialism by a setting forth of his own ideals, securely founded upon the fundamental deductions of his science.

The subject thus outlined is too vast to be dealt with within the compass of a short paper. All that it is proposed to do here is to suggest to geographers some paths along which fruitful investigation seems possible, and to set forth some of the conclusions to which the lines of reflection followed in the works mentioned have led me.

In detail, what I propose to do here is to attempt to show, from a standpoint somewhat different from the one previously adopted, that the direct and slow process of adaptation to diverse environments which occurs among animals today, as it must have occurred in a precisely similar fashion among primitive men—the process which produced geographical races among men—is now of little significance in human life.

Secondly, I wish to suggest that the place of this process, in producing and maintaining human diversity, has been taken by another, more direct and far more rapidly produced form of adaptation. The effects of this process, it will be suggested, are to give rise to a form of diversity for which we have as yet no name save the somewhat vague one of nationality; for the “nations,” in so far as they are true entities, and the regional groupings which bear to them something of the relation which species show to genera among organisms generally, seem to me to be the human adaptive response to environment. It is this response, it is believed, which produces evolution in civilized man, or, in other words, leads to increased fitness to survive.

Finally, an attempt will be made to show that the ideal of industrialism, or what some German socialists call internationalism, would mean—were it to be successful—the loss not only of all that is distinctively human but even of the power of adaptation itself. Were man to become a parasite of the machines which his hands have created, he would not only acquire the characters of the parasite, but, necessarily, he would at the same time show that loss of the capacity for variation which stamps the parasite so deeply and is to the biologist the proof that for it racial extinction is approaching.

THE GEOGRAPHICAL SIGNIFICANCE OF THE SUBJECT

To this summary statement two brief explanatory notes may be added, which may serve to indicate the geographical importance of the subject discussed. By nationality I do not mean state. The ideal state, to my mind, would be a collection of regional groupings, connected together by a community of interest greater than that which drew any one of them towards any outside state, occupying an area with a common attractive center, that area being separated from surrounding states by boundary zones relatively unsuited to human life and not occupied by any large, coherent groups of people. Such a state would further be strong enough, both morally and materially, to permit each regional grouping within its boundaries to express its individualized corporate life; would realize, that is to say, that its strength came rather from harmonious diversity than from an imposed uniformity. This means, in its turn, that the desire to preserve the “principle of nationality” as the supremely important factor in human life is not to be regarded as meaning that each localized grouping, even if well defined, must necessarily form a “nation” in the juristic sense.

Again, lest it be said that the subject of this paper, as defined above, is abstract, philosophical, or even biological rather than geographical, let me give a specific example of its general bearing on human relations.

Alsace and, perhaps to a somewhat less extent, annexed Lorraine are regions with a strong localized life, deeply enshrined in the hearts of their people. All geographers at least should admit that that localized life, embodied in tradition but based ultimately upon place conditions, is part of the world's heritage, not to be lightly tampered with. Now France, partly from geographical causes, especially the variety of her surface and climate, and partly from historical causes—for she has been less industrialized than Germany—has always, and notably since the Revolution, shown something of the divine willingness to permit diversities based upon regional groupings to exist undisturbed. We say divine, for God, according to the truth expressed in the old Hebrew legend, created diversity; it is only man, especially industrialized man, who seeks to produce uniformity.

Germany, on the other hand, partly from geographical causes—for she is largely an artificial state, without France's well-marked natural boundaries—and partly also from historical causes, has hitherto shown far less

willingness to permit regional life to exert its full influence. Her fifty years' rule of Alsace-Lorraine has been directed towards crushing out local life, that is to say to robbing the world of something which can never be replaced.

Now, if the thesis which it is sought to maintain here is well founded, any extension of this type of rule, without essential modification of its aim—nay, more, even a continuance in unmodified form of the present rule in Alsace-Lorraine, as in Poland, must mean an attempt to stop the process of evolution in the form in which it occurs among modern men. Against such an attempt there must always be struggle—unless the creative force has spent itself, as some pessimists would have us believe, and civilized man as we know him is destined to pass away from the earth. Surely, therefore, the problem is one which the geographer has to face, one in regard to which he must, if he is to justify his existence, strive to think clearly.

THE ORIGIN OF VARIATION IN ANIMALS

The attempt to prove that the causes which have produced organic evolution among animals differ in kind from those acting in the case of modern man, which constitutes the first stage in our argument, necessarily involves some discussion of the former problem. For our purpose the treatment need only be brief.

Most biologists, with or without qualification, would probably accept the following presentation, necessarily somewhat crudely put on account of limitations of space.

We can look back, with a considerable degree of assurance, to a period when the earth was covered by the primordial ocean. Within that ocean, somewhere and somehow, living matter arose. The first organisms, in all probability, showed a considerable degree of uniformity. This conclusion is based, first, upon the evidence of the rocks, for life becomes more complex as we examine the strata of the successive periods, and, secondly, is a deduction from the presumed fact that the environmental conditions were originally more or less uniform.

As dry land arose, as surface relief became more and more complex, and as all the phenomena associated with a complex relief developed, there was a parallel development of diversity among organisms. This diversity is supposed to have originated in something like the following fashion. The originally uniform environment underwent change, differing here from its condition there. The organisms at the same time displayed the power of varying. In any particular set of conditions some varieties were better fitted to survive than others; in the course of the struggle for existence such varieties maintained their hold while others died out. A continuation of the process led to an increasing diversity of organic life and therefore to a more intense struggle and thus again to further evolution. That evolution in its turn meant an adaptation to particular environmental conditions so

close that related forms were prevented from encroaching on one another's terrain. This may occur in one or both of two ways. There may be an actual geographical barrier, such as the tundra zone which separates the area inhabited by the brown bears of the northern forest zone from the Arctic fringe haunted by the polar bear. Again, as happens in this case also, the adaptations of each form to a particular terrain may be so close that it is virtually impossible for it to exist within the area in which the related species finds a home. Thus the brown bear is structurally and physiologically unfitted to obtain or eat the food substances upon which the polar bear depends, and it could not find its own kind of food within the polar bear belt.

Some form of isolation of this kind seems always to appear in the case of evolving species, and, when it lasts for a prolonged period, it is followed or accompanied by a physiological difference so great that even when the two kinds of organisms do meet on some neutral ground, interbreeding between them is impossible.

Thus we may recognize four great factors which tend to produce permanent differences between organisms generally, leading ultimately to the origin of new species. There is (1) the essential condition of a diverse environment; (2) an apparently slow acquisition of fitness to particular environments, the effects of life in each set of surroundings being supposed to act through a long period of time; (3) the presence of some form of barrier, either an actual geographical feature of the earth's surface, such as a desert, cold or hot, a mountain chain, a belt of seawater, etc., or the physiological barrier of a marked contrast between modes of life. Both, as we have shown, may be present simultaneously. Finally, as a secondary phenomenon, due according to some to previous isolation, (4) physiological sterility occurs, and, when this takes place, varieties have become species.

THE ORIGIN OF DIVERSITY IN MAN

We have next to consider the question how far these factors can be said to affect the process of evolution in man, and in this case it is convenient to reverse the order given above.

In the first place it is clear that there is no such thing as interracial sterility in the case of man, for all breeds seem to be perfectly fertile when crossed. It may be said that this simply means that there is only a single human species. But I think it implies something more than this. All anthropologists are agreed that, in earlier days, the genus *Homo* was represented by more than one species. Since these primitive forms are only known by their bones we cannot be certain that the morphological differences were accompanied by the development of sterility, cannot learn whether the differentiation stopped before this point was reached. Similarly, it is a disputed point whether *Homo sapiens* is the direct but modified descendant of one of the primitive forms or whether he is of mixed ancestry;

in other words, it is doubtful whether a blending did or did not occur between races not yet differentiated into species and whether modern man may have risen from such a blending.

In either case it is clear that, whereas a tendency to the formation of species once occurred in the case of man, this tendency, at some period of his history, was definitely checked and has shown no indication of arising anew. This forms part of the evidence for the view that the environment acts on man in a different way from that in which it acts with other organisms. One of the causes of the cessation of species formation in man seems to be that, owing both to his intelligence and to his nimbleness, no barrier, such as those which serve to separate animals, can act permanently in his case. This seems to me to be true both as regards actual physical obstacles and as regards that furnished by an adaptation to different modes of life.

The first point may be dismissed briefly. It is a commonplace that, especially as some degree of specialization is attained, no geographical feature can permanently separate races of man. No mountain chain is so lofty, no desert—cold or hot—so barren, that by human ingenuity and skill it can not be crossed. No ocean is so wide, no marsh or forest belt so impenetrable that it will not finally yield a passage.

The second point merits a somewhat fuller discussion than can be given here; a few indications must suffice for our purpose. In a sense it may be said that many human societies, especially primitive ones, show as delicate and as complex an adaptation to particular surroundings as ever does animal in form and function. But in the first place the fact that the adaptation is social and not individual is important; in the second, owing to his great adaptability, itself largely dependent upon his *relatively* low grade of structural specialization (as shown for example in the nature of his teeth, and even in the form of his limbs) and dependent also upon his high grade of intelligence, man can form new habits, adopt new modes of life, with surprising rapidity.

Thus, out of the four factors which influence evolution in animals, we have left only the first two as possibly acting in the case of man. Both demand a little care and consideration.

THE EFFECT OF THE ENVIRONMENT ON MAN

Let us take first the question of environmental diversity. It may be said that it is a foregone conclusion that if the physical and organic environment is diverse for animals, so must it also be diverse for man. But it is just this apparent commonplace that has been questioned by those who uphold what we have called the ideal of advanced industrialism.

The concept implicit in the ideal of internationalism, itself a product of advanced industrialization, involves the assumption that men everywhere are becoming similar. Now if the environment is really diverse, and if

there remains in man any capacity for adaptive response to varying environmental conditions, that ideal is impossible of realization. To the Germans, accustomed to work out in detail the basis of their beliefs, this fact is perfectly obvious. We find, then, in various German authors a deliberate attempt made to prove that, in the industrialized world, the part of the environment important to man is not diverse but is steadily becoming more and more uniform.

This position is worked out with some fulness in a book by Dr. Renner²—a book which should be translated into English. In it the author sets forth with clearness, though often with much disingenuousness, the effects of advanced industrialization on human life. For him this involves the suppression of nationality as a concept which has outlived its usefulness. In order to justify this forcible suppression he attempts to prove that as a result of international means of communication and of international trade, man no longer, as it were, lives on a particular part of the earth's surface and has no longer important direct relations to the physical conditions prevailing around his dwelling place. In his view man has become detached from all the old relations and is only a citizen of a state which supplies all his needs and intervenes between him and direct contact with mother earth.

Renner points out, what is in part an obvious fact, that the house in which industrialized man lives, the clothes he wears, the food he eats, etc., are no longer deeply stamped with the mark of local place relations, but are becoming more or less uniform throughout the industrialized belt of the world. To him the state is justified in completing by force a process which seems to him inevitable in any case. Now, if this be true, it must mean, as it seems to me, that the production of variation in man is to cease, while, by its very statement, it means that existing variations and adaptations are to be, so far as possible, wiped out.

It means that the production of variations in man must cease, because, unless the biologists are wholly wrong, variation arises only in response to environmental diversity. If the environment is to be rendered artificially uniform, we must in the long run all become uniform also and meantime can only, as it were, live upon our accumulated capital of variations—those inherited from an earlier period when the environment was admittedly diverse.

Dr. Renner puts the matter with equal boldness and clearness, and the deduction which he has the courage to make is that against which, as already stated, the greater part of the world has revolted instinctively. But if he puts the matter with distressing plainness and carries his argument to its logical conclusion, some parts of the same chain of reasoning have struck many different types of mind. There is a sense in which it is true that industrialization has brought a new uniformity, as it has certainly brought a new ugliness, into our lives. A perception of the fact has, I think, had

² Karl Renner: *Marxismus, Krieg und Internationale*.

much to do with that emphasis on race which, from many different sides, has made itself heard in recent years.

What many of those who lay excessive stress upon the differences, both the physical and the far less definitely known intellectual and moral differences between races and subraces of men, really desires to do seems to me to throw up in high relief existing differences, real or supposed, in a pathetic attempt to preserve the menaced variety of men. The tree, they seem to say, will throw out no new shoots; no fresh crown of leaves and blossoms will come to adorn it: therefore let us do all we can to preserve the products of past free growth; let us even put branches under glass cases and keep them as decorations to gladden us during the winter of our discontent.

As against this counsel of pessimism, I would assert boldly that the fount from which variations once arose has not dried up. It is as productive as of old: it is only the form which has changed—the capacity for growth has not been lost.

To me it seems that, as contrasted with the *slow, indirect* mode of producing and establishing visible variations in animals, which involves a keen struggle for existence and the passage of many generations, human societies have a *speedy, direct* capacity for adapting themselves to place conditions, a capacity which can display itself within one or a few generations. Further, while this power of change is, or may be, extremely rapid when no outside interference is attempted, it shows, when faced with a subsequent attack, that power of resistance, that spontaneous reappearance after apparent suppression, which is so characteristic of the fixed variations of animals. Our most carefully bred and selected domesticated animals will “throw back,” as we say, to their wild ancestors, the old adaptive characters having more capacity for survival than the new non-adaptive ones. So, in human life, you may forcibly convert the Pole by a shifting of frontiers into a German or an Austrian or a Russian, but none the less does he “throw back” to the Pole and become more definitely Polish than before the process of conversion was attempted. Similarly, not only can the Alsatian not be forcibly converted into a Prussian, but, at least to some extent, within Alsace the immigrant Prussian acquires certain of the characters of the Alsatian. In other words he shows an adaptive response to his new environment.

Further I would suggest, as already hinted, that this peculiarly human type of variation affects not only individuals but reaches its most characteristic form in nationality and in those regional groupings which exist so markedly in some national states.

Many of the characters which are popularly regarded as race characters seem to me merely examples of this direct adaptive response to environmental conditions. Take, for example, the presence of seafaring instincts in a people. Many geographers have shown, with a wealth of detail, that

wherever we find a coast line fitted for maritime enterprise, we are likely to find a population who are seafarers by instinct. Some go further and regard this as a "racial" character. Thus many speak of the English love of the sea as an Anglo-Saxon racial character. But within England, small as is the total area, there is a very sharp contrast between the coast dwellers, those with an "instinctive" knowledge and love of the sea, and the inland people to whom it is vast, mysterious, dangerous. So obvious is the distinction to close observers that keen advocates of the racial theory are constrained to take a further step and assume that the maritime population represents a distinct strain, despite the obvious physical differences between the fishers in different parts of the long coast of Great Britain and its connected islands. But if the fishing population has well-marked common characters as regards habits and modes of life and general outlook, so have the miners. Will the racialist take the further step and assume that the pitmen, though deep mining rose but yesterday, are of the same race in all the parts of Great Britain in which they occur? The suggestion is obviously absurd.

Again, that the Slavs are not seafarers and the Greeks are, is a geographical commonplace. But where the Slavs come down to a sea eminently suitable for coastal navigation, in Dalmatia, there they show all the characters of a maritime people and form the material from which the Austrian fleet is chiefly recruited. So when the Greek settles in the interior of Asia Minor he loses his supposed racial characters and becomes merged in the general population of tillers of the soil.

Take another example. Since the outbreak of the war Englishmen have come into closer contact than ever before with the men of the "new nations" across the seas. There has come to both from this closer contact a deeper sense than before of differentness—of a difference which runs through modes of life down to habits of thought. It may be said that part of this marked distinctness comes from the fact that in Canada and Australia and South Africa alike there has been a blending of races, that none has been peopled wholly from the British Isles. But the distinctions, oddly enough, are often as marked in those who are English-born and who have, in the course of relatively few years, acquired not only a new consciousness of nationality but a new outlook on life. It seems to me difficult to doubt that there is here a direct environmental effect.

All such cases—and many other examples could be given—suggest that where environmental influences are permitted to operate, there is a rapid response in the form of new regional groupings, i. e. of incipient nationalities. If it be objected that this does not meet the problem raised by Renner and others who assert that environmental diversity is in course of disappearing, I should reply that their assertion is largely based upon an illusion.

It is only true, and even there but very partially true, in regions where industrialization is far advanced. But modern large-scale industry is but

a form of "robber economy"; it is based ultimately upon a robbery of the earth's stored resources of power in fuel, of her stored fertility in virgin lands, of the labor of unorganized tropical peoples, and the like. Therefore to my mind, *in its present form*, it will prove—is now proving—as temporary as any other form of exploitation of natural reserves. Much of the stored wealth of the industrial period has already gone up in smoke and dust on the battlefield, and the world will have to begin afresh with a careful utilization—not an exploitation—of natural resources.

During the feverish development of the later industrial period the newly discovered reserves were largely squandered in wasteful living. The world to which peace comes will be in many ways a changed world, one in which patient and laborious agriculture will have to count for more. In such a world new regional groupings may be expected to rise, new forms of human diversity will originate; instead of husbanding diversities due to past conditions, man in the course of the process of reconstruction and reparation will be able to produce new ones. In that world also, let us hope, a new tolerance of differences will rise, and we shall learn something of what those differences mean for man and for civilization.

CENTRAL HUNGARY: MAGYARS AND GERMANS*

By B. C. WALLIS

[With three separate maps, Pls. XVIII-XX, facing p. 432.]

Central Hungary stretches from the Austrian border eastwards to the foothills of the Bihar massif; it is almost equally divided by the long north and south reach of the river Danube. The western portion, here called German Magyaria (see Fig. 2), is a country of lowlands and low, well-wooded hills. These moderate heights are the outliers of the Eastern Alps, and the main chain stretches from Lake Balaton, the largest sheet of fresh water in Europe, to the great bend of the Danube at Vác (Pl. XVIII). German Magyaria is bounded by rivers on three sides, the Danube on the north and east and the Drave on the south. In the northeast corner German Magyaria is kept away from the Danube by the county of Pest-Pilis-Solt-Kiskun, which contains Budapest and forms part of Magyaria. In the southeast corner the western area is kept away from the confluence of the Drave and Danube by South-Slav Hungary. The eastern portion, here called Magyaria, consists of the major portion of the Hungarian plain, the Alföld. It includes the greater part of Cumania, the district between the Danube and the Tisza, and extends northeast to the great bend of the Tisza near Nyír; in the south the boundary passes through the confluence of the Maros with the Tisza and the confluence of the White with the Black Körös.

German Magyaria lies east of German Austria between Slovak and Croat lands. Magyaria marches with Ruthenian Slovacchia, Ruthenia, the Rumanian Forelands, and South-Slav-Hungary, so that its inhabitants, the Magyars, have as neighbors Germans, Slovaks, Ruthenians, Rumanians, and Serbs. In no place does the boundary of Magyaria coincide with the boundary of Hungary.

Central Hungary covers 31,000 square miles and contains nearly 7,000,000 people, i. e. a quarter of the country contains a third of the population. There are no extensive areas of mountainous country without houses and villages; the chief hindrances to settlement are the inundation areas of the rivers, and these are gradually being reclaimed, so that the density of the population is above the average for Hungary.

POPULATION

Central Hungary has a population equal in number to that of New England but crowded into half the New England area; it has both a third

* This is the last of a series of four articles. The previous articles were entitled "The Rumanians in Hungary," "The Slavs of Northern Hungary," "The Slavs of Southern Hungary" and appeared respectively in the August, September, and October *Reviews*. An explanatory note on the maps accompanies the first article.—EDIT. NOTE.

of the area and a third of the population of the three states of New York, New Jersey, and Pennsylvania. Budapest, the Hungarian capital, is in the northwest of Magyaria; it has 880,000 inhabitants (cf. Boston, Mass., with 756,000 inhabitants; Philadelphia with 1,700,000). In the city there are 200,000 Jews, most of whom are officially included among the 756,000 Magyars claimed officially as the number of members of the dominant race in Budapest. The Germans number 79,000 and the Slovaks about 20,000. Recent travelers carry away with them the impression that the capital is a Jewish city, since the Magyar notables, with their passion for country life, leave the Jews to make the greatest show in the social life of the city. The Slovaks are the laboring element; their women are famous foster-mothers. Magyaria also contains the second city in Hungary in point of population, Szeged, with 118,000 people and a municipal area of 204,000 acres (cf. New Bedford, Mass., with 118,000 people and 12,000 acres). There are four other municipalities in Magyaria: Debreczen, the fourth city in Hungary (with 93,000 people and 239,000 acres; cf. Oklahoma City with 93,000 people and 11,000 acres), Kecskemét (66,000), Hodmészö-Vásárhely (62,000), and Miskolez (51,000). In German Magyaria there are four municipalities: Györ (44,000), Székesfehérvár (37,000), Sopron (34,000), and Komárom (22,000).

THE PEOPLE OF CENTRAL HUNGARY

German Magyaria contains 2,750,000, and Magyaria just over 4,000,000 inhabitants. The average rate of natural increase of the population per annum is the same in the two areas; the total net emigration during the decade 1900-1910 was practically the same, 70,000, for the two districts, but by internal migration German Magyaria lost people equal to a third of the natural increase, while Magyaria gained people at a slightly faster rate (Table I). All these changes occurred at a slightly higher rate than the

TABLE I—POPULATION CHANGES IN CENTRAL HUNGARY, 1900-1910
(Population in thousands)

	TOTAL POPULATION		NET INCREASE (b)-(a)	EXCESS OF BIRTHS OVER DEATHS	CHANGE (c)-(d)	ESTIMATED NET EMI-GRATION	MIGRATION WITHIN AUSTRIA-HUNGARY
	1900	1910					
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
<i>German Magyaria</i>							
Thousands	2,589	2,732	143	316	-173	-70	-103
Per cent.....	...	...	5	12	7	3	4
<i>Magyaria</i>							
Thousands	3,566	4,120	554	452	102	-69	171
Per cent.....	...	...	15	12	3	2	5

corresponding changes in the Rumanian Forelands except in the case of emigration, which was slower than from any other part of Hungary. The internal migration indicates a larger shifting of the population than occurs

elsewhere and is largely accounted for by the rapid rise, which was in fact exceptional for Hungary, in the number of people in Budapest and its immediate surroundings.

The steady and continuous rise in the numbers of Magyars in both districts is shown in Figure 1. The Magyars in the western district have

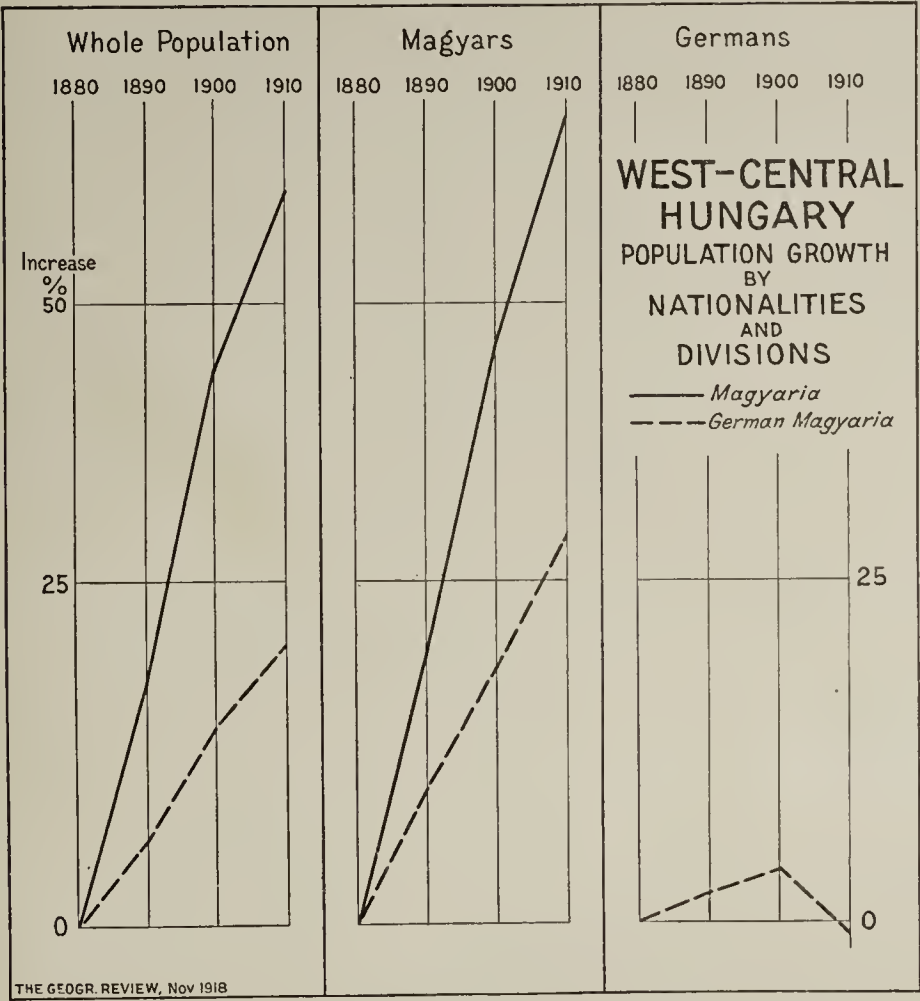


FIG. 1—Diagram showing, by nationalities and divisions, the population growth in central Hungary from 1880 to 1910.

In this, as well as the corresponding diagrams in the previous articles (Figs. 1 and 2, pp. 158 and 161; Fig. 1, p. 271; Fig. 1, p. 344), the vertical scale is not arithmetic, but logarithmic. The intervals 0-25, 0-50, etc., have been made proportional respectively to the logarithms of 1.25, 1.50, etc. The slopes of the population growth lines thus directly indicate the *rate* of increase.

increased in numbers about as quickly as the average increase for the total population of Hungary proper (Fig. 1, p. 158, first article), while those in the eastern district have increased more rapidly than any other element of the Hungarian peoples with the single exception of the Magyars in northern Hungary (Fig. 1, p. 271, second article). By contrast the Germans in German Magyaria have practically remained steady in numbers for thirty years; this indicates a distinct tendency for the Germans to leave Hungary. The decline of the Germans in Magyaria from 7 per cent of

the population in 1880 to 4 per cent in 1910 (Table II) is only exceeded by the decline of the Germans in Ruthenian Slovachia.

Two-thirds of the people in German Magyaria are Magyars, one-sixth are Germans, and the Jews form a small element of about 3 per cent. The remainder, about 10 per cent in all, are mainly the scattered Croats near the Austrian border and the Slovenes who have intruded from Austria into the lands just north of the Mur (Pl. XIX). In Magyaria the Jews have doubled their numbers in thirty years and form an important element in the population by reason of their eommereeial ability and their hold upon the life of Budapest. Most of the other people (5 per cent in number) are Slovaks; their ehief island lies in the boundary zone between Magyars and Rumanians on the east of Magyaria (Pl. XIX, and Pl. IX, first article).

Table II in the second article (p. 270) and Table II below eombine to indieate a fact of considerable moment. In Ruthenian Slovachia for every

TABLE II—NATIONALITIES IN CENTRAL HUNGARY, 1880 AND 1910

NATIONALITY	GERMAN MAGYARIA			MAGYARIA		
	1880	1910	INCREASE PER CENT	1880	1910	INCREASE PER CENT
Thousands.....	2,275	2,732	20	2,626	4,256	62
Density per square mile.	144	175	...	165	266	...
MAGYARS						
Thousands.....	1,481	1,905	28	2,038	3,518	72
Per cent.....	65	70	...	77	83	...
GERMANS						
Thousands.....	436	432	—1	188	155	—17
Per cent.....	19	16	...	7	4	...
JEWS						
Thousands.....	88	81	—8	172	350	104
Percentage.....	4	3	...	7	8	...

10 Magyars in 1880 there are 17 today, in Ruthenia for every 10 in 1880 there are 18 now; in Magyaria there has been praectically an equivalent inerease. In Ruthenia for every 10 Jews in 1880 there were 18 in 1910, and in Magyaria the increase has been even greater. The pressure of the Magyars and Jews is exerted strongly towards the northern limits of the Alföld; it has even extended into Transylvania, where the Magyars are inereasing their hold on the country by their movement towards the eentral basin by way of the lower elevations in the northwest. The Germans are losing ground rapidly in the faee of this pressure.

THE GERMANS IN GENERAL

In Hungary there have been eonsistently throughout three deeades just under 2,000,000 Germans. With the exeption of the Jews they are the most scattered of the non-Magyar peoples. They owe their position to the faet that the Austrian Empire of earlier years was governed in the interests of the Germans of central Austria. As the power of Austria was in process of east-ward extension after the Turkish hordes had been definitely beaten back, Germans were sent to the limits of the empire as frontier guards, but more

often they were tempted as colonists of the wasted areas by a system of assisted emigration: they received grants of land, freedom from taxation, and assistance towards house building and the purchase of farm implements. During the latter half of the nineteenth century the Magyar has risen to power within the boundaries of Hungary, and both German influence and German population have declined. The trail of the gradual withdrawal of the German element is marked by the retention of German place names for villages without a single German inhabitant; under the recent passion for Magyarization many of these place names have disappeared from the official registers, though they are still locally used. The German settlers have always been a pattern to the other races in the arts of husbandry and in the conservatism which tends to maintain racial antagonisms. The Germans in the villages have preserved the purity of their race by a calculated disdain of the other peoples. The German controversialist, keen on elaborating a case for the German influence in Hungary, argues that some Germans have proved adaptable and become Magyars and that the Magyar official deliberately falsifies the census statistics to prove that the German element is declining in numbers. The weight of evidence is against these contentions. In recent years the Germans have migrated or emigrated in comparatively large numbers; their rate of natural increase is below the average for Slavs or Magyars; and a diligent search, village by village, through the records fails to reveal more than an occasional instance where it might reasonably be inferred that the census information has been falsified. Tenacious of his ancestral customs, better educated than his neighbors, a stolid industrious worker on the land, the German villager is not interested in questions of *Weltpolitik*; he has preserved and maintained an efficient educational and medical service, so that on the whole he has tended to be a definite race living in groups of villages ringed round with non-Germans whom he despises and at times dreads; hence the German fortress-churches. His losses are due in part to his scattered settlements and to recent economic progress; in recent years, when the German has emigrated from Hungary, he has usually gone not to the Fatherland, but to America.

THE JEWS IN GENERAL

The question of the decline in the number of the Germans is complicated by the fact that in the earlier years under review a very large proportion of the Jews in Hungary were German Jews, who have not maintained a steady adherence to the German language as their mother tongue. Wherever there arises an opportunity for financial dealings, either on a large scale as a mortgagee for the large estates of a gambling, spendthrift, Magyar noble or on a small scale as the host of the village inn and money-lender to the peasants, there a Jew will be found. It is said that the Jews are the biggest employers of labor, outside of agriculture, in Hungary. Consequently the Jew is found in the towns and larger villages. In a dis-

trict which has but a small Jewish population the greater number of them congregate in the particular town or village which is the center of local government. It follows, therefore, that the controversialist or the Pan-Nationalist who fails to separate the Jews from the Germans fails to discover the true state of affairs regarding the position of the German in Hungary.

It is demonstrable that those Jews who were originally German by mother tongue and who inhabit a district where Magyar schools predominate gradually become Magyar-speaking Jews, and it is equally certain that the process is carried a stage further when the Magyar-speaking Jew becomes no longer a Jew but a Magyar. A common opinion is that the Germans are adaptable and easily assimilated by the Magyar majority; this dictum is probably false regarding the German, but it is certainly true regarding the Jew.

It is estimated that the Jews in the world number 13,000,000; one million live in Hungary, where they form 5 per cent of the population and exert an influence which is out of all proportion to their numerical strength. The "subject races" are tillers of the ground, live in rural communities, and lack the leadership of a large and influential leisured, middle, or professional class; the Magyar disdains trade or industry; consequently, in all matters of trade, finance, and industry, i. e. in all those affairs which contribute most forcibly to modern progress, leadership has fallen to the Jews, who thrive and multiply. It is commonly asserted that the methods of the Jew are not above reproach, and it cannot be doubted that many Hungarian thinkers view with considerable apprehension the dominant position of the Jew in the Hungarian community.

THE MAGYARS IN GENERAL

Of the 10,000,000 Magyars in Hungary, roughly nine-tenths are peasants in little better economic situation than the "subject races." Condemned by the rigors of the climate to a long winter of comparative idleness, lacking the paternal care of a responsible land-owner who takes an interest in his tenantry and exerts himself to provide means of social improvement in the villages on the estate, the energetic Magyar peasant frequently emigrates to the New World, where he finds a social organization so superior to his own that not more than one in five of the emigrants is tempted to return to his native land. There is, however, one important difference between the state of the Magyar and that of the non-Magyar: whatever opportunity for improvement in life is meted out by the bureaucracy to the people, that opportunity is exclusively for the Magyars. The growth of the Magyar power has resulted in a tremendous multiplication of administrative officials; it is a Magyar plaint that the number is out of all proportion to the needs of the country; these posts are exclusively for Magyars. Consequently, the children of Magyar peasants find their way into the public

service and become part of the machine which is bent upon making Hungary the home of one people—none but official Magyars. Hence there has arisen an official and professional class which is the mainstay of Magyar chauvinism. There is not the slightest doubt that the Magyar noble is a cultured and pleasant gentleman; the individual Magyar is courteous, hospitable, and genial, with many of the best social characteristics of the traditional “cavalier”; but the Magyar machine is responsible for the neglect of subject peoples of small account, such as the Ruthenians, and the oppression of others of greater political influence, such as the Slovaks.

NATURAL INCREASE OF THE POPULATION

The German rate of natural increase in German Magyaria (Table III) is almost as great as the German rate in South-Slav Hungary (Table III,

TABLE III—VITAL STATISTICS, 1900-1910

NATIONALITY	RATES PER 10,000 PER ANNUM			INFANT MORTALITY PER CENT OF LIVING BIRTHS	ILLEGITIMATE BIRTHS PER CENT OF TOTAL BIRTHS
	BIRTH	DEATH	NATURAL INCREASE		
German Magyaria					
Magyars	362	231	131	20	5
Germans.....	364	240	124	23	7
Magyaria					
Magyars	404	266	138	22	6

p. 346) and exceeds that of the Germans in Transylvania (Table V, p. 162). The Magyar rates of increase are higher than that of the Germans but fail to reach the level of the Magyar rates of increase in Ruthenia (Table III, p. 273) and the Rumanian Forelands (Table V, p. 162) ; it is noticeable that Magyar rates get gradually higher from west to east, to drop again farther east in Transylvania. Since the birth rates of central Hungary reach a high level the rate of infant mortality is also high ; illegitimacy rates are proportionately low in the rural communities sampled to provide the results indicated in Table III. Vital conditions are less vigorous in German Magyaria than in Magyaria. This fact must bear some relation to the losses by emigration and internal migration from the western area.

MOVEMENTS OF THE PEOPLES

Emigrants left both areas in equal numbers, but the rate from the western district is 50 per cent higher than that from Magyaria. The Germans form 17 per cent of the population of German Magyaria and provided 34 per cent of the emigrants, very few of whom went to Germany.

The excessive emigration of Germans was a general feature from all the counties in which the German element is large (Fig. 2). It accounts for the shape of the German curve in the diagram showing rates of change

of the nationalities (Fig. 1). The net balance of internal migrations gave German Magyaria a loss of 100,000 people in a decade and Magyaria a

TABLE IV—ESTIMATED NET EMIGRATION, 1900-1910
(Percentages of total)

		(A) NATIONALITIES	
		MAGYARS *	GERMANS
From:	German Magyaria.....	57	34
	Magyaria.....	88	..
		(B) DESTINATIONS	
		To: Germany	America
From:	German Magyaria.....	6	91
	Magyaria.....	..	90

gain of 170,000 people during the same period, so that the eastern area increased its population at three times the speed of the western area.

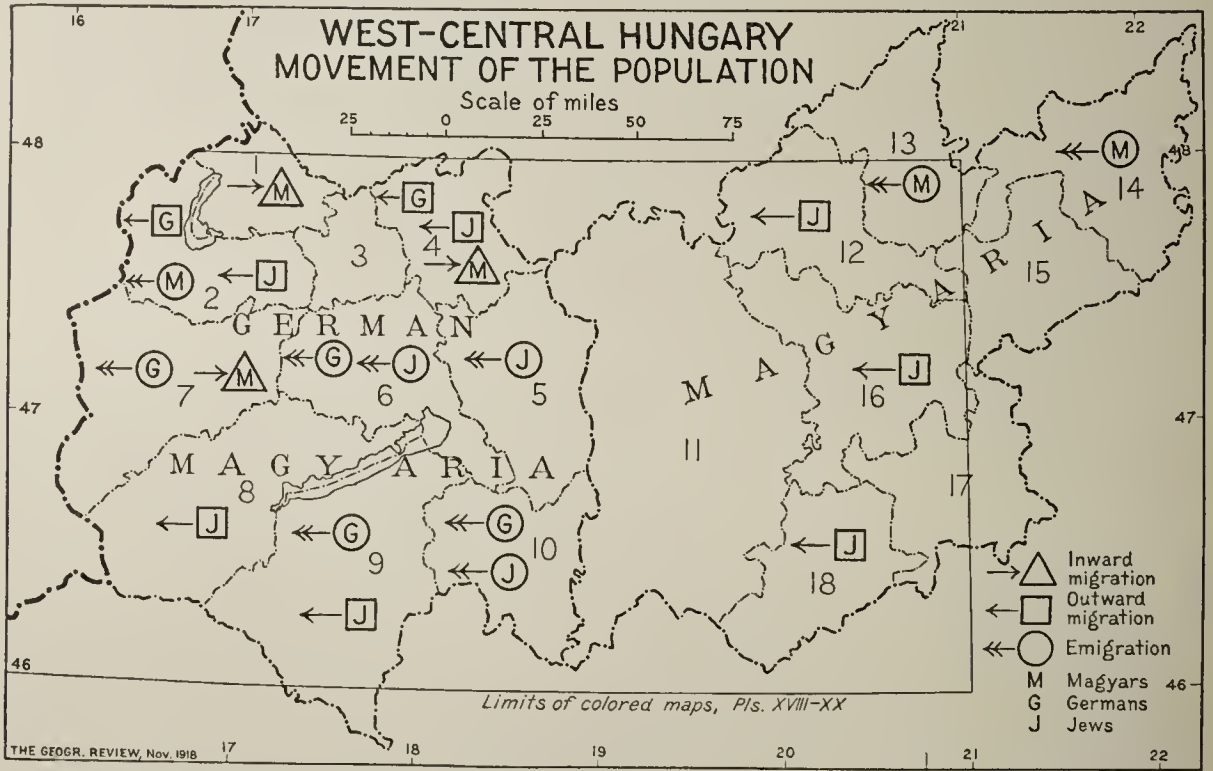


FIG. 2—Cartogram of west-central Hungary showing the movement of the population. Scale, 1:4,250,000.

For the names of the counties indicated by hair-line numerals see the key below. The counties are grouped to form two large divisions for the purposes of this article, German Magyaria and Magyaria. The statistics in the tables and elsewhere in the text relating to these two divisions are based on the constituent counties as here shown.

Key to Counties: 1, Moson; 2, Sopron; 3, Győr; 4, Komárom; 5, Fejér; 6, Veszprém; 7, Vas; 8, Zala; 9, Somogy; 10, Tolna; 11, Pest-Pilis-Solt-Kis-Kun; 12, Heves; 13, Borsod; 14, Szabolcs; 15, Hadju; 16, Jász-Nagi-Kun Szolnok; 17, Békés; 18, Csongrád.

Figure 2 indicates the main features of the movements of the people. There was a definite inflow of Magyars into the counties which lie near to the boundary of Slovachia and a loss by internal migration of the Jews in the southwestern counties as well as in the counties in the far east. Where

there was no excessive emigration of Germans there was still a loss by an outward migration. From the counties bordering Ruthenian Slovachia there was an emigration of Magyars; this is an indication that the unsettled conditions which prevail in Ruthenian Slovachia obtrude themselves into Magyararia; for the Magyar population is increasing despite the outflow, and the Magyars are pressing northwards, as has previously been noted. Magyars are, therefore, tending to move in four directions: towards the capital, northwestwards along the lowlands of the Danube, northwards into Ruthenian Slovachia over the lowlands, and eastwards into Transylvania. A diligent search through the censuses, village by village, fails to show many cases of what might appear to be “juggling with the figures,” and some of these cases indicate results which tend to reduce the proportion of Magyars. They must be considered to demonstrate little more than the unsettled nature of the communities where they occur; a fair proportion of such cases are to be found among the villages of Ruthenian Slovachia and the neighboring parts of Magyararia.

RELIGIONS

More than three-fifths of the people in central Hungary are Roman Catholics; the proportion is highest in the west, adjacent to Roman Catholic Hungary and Croatia. Among the Protestants, the Calvinists are Magyars

TABLE V—RELIGIOUS ADHERENCE
(Percentage of total for each nationality)

NATIONALITY	ROMAN CATHOLIC	CALVINIST	LUTHERAN	JEWISH	UNIATE	OTHERS
<i>German Magyararia</i>						
Germans	80	15	19	3	2	1
Magyars	75	15	7	3	2	2
<i>Magyararia</i>						
Magyars	56	31	3	4	5	1

and the Lutherans are usually Germans. A few of the Magyars are Uniates or Jews. The Calvinist Magyars are most numerous in the neighborhood of Debreczen, which has been called the Calvinist Rome.

ELEMENTARY EDUCATION

In central Hungary nineteen schools out of twenty are Magyar; the German schools in the western area are 3 per cent in number although

TABLE VI—ELEMENTARY EDUCATION, 1910

	PERCENTAGE OF TOTAL NUMBER OF CHILDREN BETWEEN 6 AND 14 NOT ON THE SCHOOL REGIS- TERS	PERCENTAGE OF THE UNREGIS- TERED WHO ARE OFFICIALLY EXCUSED FROM SCHOOL ATTENDANCE	PERCENTAGE OF THE SCHOOLS			
			(i) WHICH ARE:		(ii) WHERE THE LANGUAGE OF INSTRUCTION IS:	
			STATE OR COMMUNAL	CHURCH	MAGYAR	NON-MAGYAR
German Magyararia....	4	26	14	85	96	4*
Magyararia.....	12	21	35	62	99	1

* 3 per cent German.

17 per cent of the people are Germans. The Magyar bureaucracy, which its settled policy of Magyarizing the children, here oppresses the Germans. Despite this fact German Magyaria has the best school attendance in Hungary, better even than exists in Slovachia. The proportion of state or communal schools, 14 per cent, is the lowest in the kingdom.

PUBLIC HEALTH

Medical treatment before death is received by the Magyars and Germans more frequently in these areas than in any other part of Hungary, and the Germans are worse treated by the medical service than the Magyars. The rates of death from tuberculosis do not differ materially from those

TABLE VII—PUBLIC HEALTH, 1901-1910

NATIONALITY	PERCENTAGE OF DEATHS		CAUSES OF DEATH (PERCENTAGE)				NOT CLASSIFIED
	NOT TREATED	NOT CERTIFIED	TUBERCULOUS DISEASES	PNEUMONIA OR PLEURISY	CONGENITAL DEBILITY	SENILE DEBILITY	
	BY A PHYSICIAN						
<i>German Magyaria</i>							
Germans	50	48	13	11	16	17	19
Magyars.....	42	38	16	9	14	15	23
<i>Magyaria</i>							
Magyars.....	32	25	15	8	14	11	28

in neighboring districts; the higher birth rate is accompanied by a high death rate from congenital debility, and the greater frequency with which medical certificates of death are given is the cause of a larger proportion of deaths from diseases outside the main official classification of causes of mortality.

Table VIII indicates a great disproportion between German Magyaria and Magyaria in the public health service, since the western area is worse

TABLE VIII—PUBLIC HEALTH SERVICE, 1910

DIVISION	NUMBER OF PEOPLE PER:			NUMBER OF FEMALES PER MIDWIFE
	PHYSICIAN	PHARMACY	HOSPITAL BED	
German Magyaria.....	4,800	8,400	700	780
Magyaria.....	1,900	7,600	270	540
Hungary proper.....	3,500	8,600	490	700

served than the average for Hungary proper, while the service in Magyaria is almost twice as good as the general average. Here again is evidence of the policy of the Magyar bureaucracy to the detriment of the non-Magyar peoples.

ECONOMIC CONDITIONS

The Magyars and the Germans are the most lettered people in Hungary; the proportion of the adults of working age is relatively high (Table IX).

TABLE IX—ECONOMIC CONDITIONS
Rural Communities

NATIONALITY	NUM- BER OF WOMEN PER 1,000 MEN	AGE GROUPS (PERCENTAGE)				PERCENTAGE OF POPULA- TION OVER 6 YEARS OF AGE ILLITERATE	HOUSES (PERCENTAGE)			PEOPLE PER HOUSE
		1-6	6-14	15-60	OVER 60		STONE OR BRICK	TIMBER	WITH THATCHED ROOFS	
German Magyaria										
Germans	1,017	16	20	54	10	23	4	1	37	6.0
Magyars	990	16	21	54	9	17	25	..	61	6.2
Magyaria										
Magyars	1,015	17	22	53	8	25	10	3	57	5.4

The houses of central Hungary are as a rule thatched and built of dried clay, but the greater wealth of the Magyars is indicated by the high proportion of stone or brick houses; in general, each house in German Magyaria holds six people, which is the mean maximum for the rural communities and is about 30 per cent higher than the average for Transylvania, where the minimum number of occupants per house is to be found.

RAILWAY TRANSPORTATION

Magyaria is worse served by railways than the western area, for two reasons: first, on the east, Magyaria has large tracts of country situated

TABLE X—RAILWAYS

DIVISION	MILEAGE	
	PER 100,000 INHABITANTS	PER 100 SQUARE MILES
German Magyaria.....	80	12
Magyaria.....	50	13

some distance from the main lines of communication and, secondly, German Magyaria, like South-Slav Hungary, is crossed by the great railway routes Paris-Vienna-Budapest-Constantinople and Budapest-Fiume.

General Conclusions

On the whole it may be concluded that the Magyars have made great efforts to attain the ideal of the official mind, a uniform "nation" within the Hungarian political boundary. In Magyaria, the stronghold of the Magyars, the population is increasing with great rapidity; in the west the bureaucracy oppresses the non-Magyars, in this instance the Germans, and thus gives a large impetus to the emigration movement.

THE MENTALITY OF THE MAGYAR BUREAUCRACY

The Magyar bureaucrat appears to be unable to achieve any measure of sympathy with any non-Magyar people, and, in recent years, he has made a naïve attempt to impose upon English public opinion. Because of his

unique language his thoughts are largely hidden even from the educated classes of Western Europe, so that he has published in English descriptions of his country and his policy which betray his lack of understanding of the non-Magyar mind. The following extracts from one of the publications¹ will illustrate this point.

The continuous compact body of the Magyars was pressed towards the center of the country from the north by the Slovaks, from the southwest and south by the Croats and Serbs, from the southeast by the Rumanians, who indeed broke through the body of the Hungarians, separating the mass on the Great Plain from the Székels, the two, however, being connected together by an unbroken chain of isolated Hungarian settlements. Here the Magyar revindication progresses slowly and with difficulty, for the most part starting from the towns. The Slovaks that settle on the Great Plain are easily absorbed by the Magyars, who in their turn begin to reoccupy the southern districts from the Great Plain; in this they are supported by the Germans; while the recolonization of Slavonia encounters many difficulties. . . .

The Hungarians conquered the land with the armed hand, and to this land they have now the right of a thousand years of uninterrupted possession. The different nationalities that live together with them within the circle of the united nation have come into the country in various ways and with divers titles The Germans have deserved well of the country by founding towns, introducing manufactures, organizing society, and, generally speaking, diffusing Western culture. They are characterized by many good qualities: industry, perseverance, order, moderation, sobriety, decent dwellings and clothing and food, education, a spirit of progress, a sense of duty, respect for the law, and attachment to the Magyar cause. *Vis-à-vis* the separatist element in the north, east, and south, the strengthening of the patriotic German is an important national interest. The Hungarians in the so-called Hungary proper are, as it were, surrounded by the several Slav races with a circular chain, open at the east, where the northern and southern ends are connected by the Rumanians. All these are, for the most part, later comers, for the Moravian and Slovene elements, which the Magyars found here when they occupied the country, seem to have been early absorbed [The Slovaks] for the most part are patriotic, but Pan-Slavist agitators in gentlemen's clothes have in some places succeeded in deluding the simple folk [The Ruthenians] are very poor and in the least degree educated, but well disposed. This good, but very much neglected race deserves more care and a better lot [The Rumanian] common people progress but slowly in civilization, yet they have fine abilities and good qualities. The great confidence they repose in the priests and leading men is often abused by selfish agitators. If the Rumanian people were once to recognize that their existence depends on their holding with the Hungarian nation, they would be of very great assistance in our eastern mission of culture. . . .

The Hebrew-German jargon spoken by a portion of the Jews cannot be regarded as a separate mother tongue: from long ago the Jews are not a nationality but a religious sect As traders the Jews are of great economical importance; their business is not considered to be unconditionally sound. The civil marriage will break down the exclusiveness of the Jews, will wear away the racial peculiarities, and will bring back many estates into the possession of the state-forming element. Charles Veleti thus expresses himself with regard to the reconciliation of these two opposing interests: "By the mixture of the Magyar and the Jew our country will gain a race which, the more it multiplies, the more firmly we shall be assured as to the permanence of the country. If intelligence and force, capacity for labor, and activity are united, those elements are mixed together for producing an honest, rich, and powerful nation to dwell in this land."

¹ "The Millennium of Hungary and Its People," Budapest, 1897.

WEST-CENTRAL HUNGARY

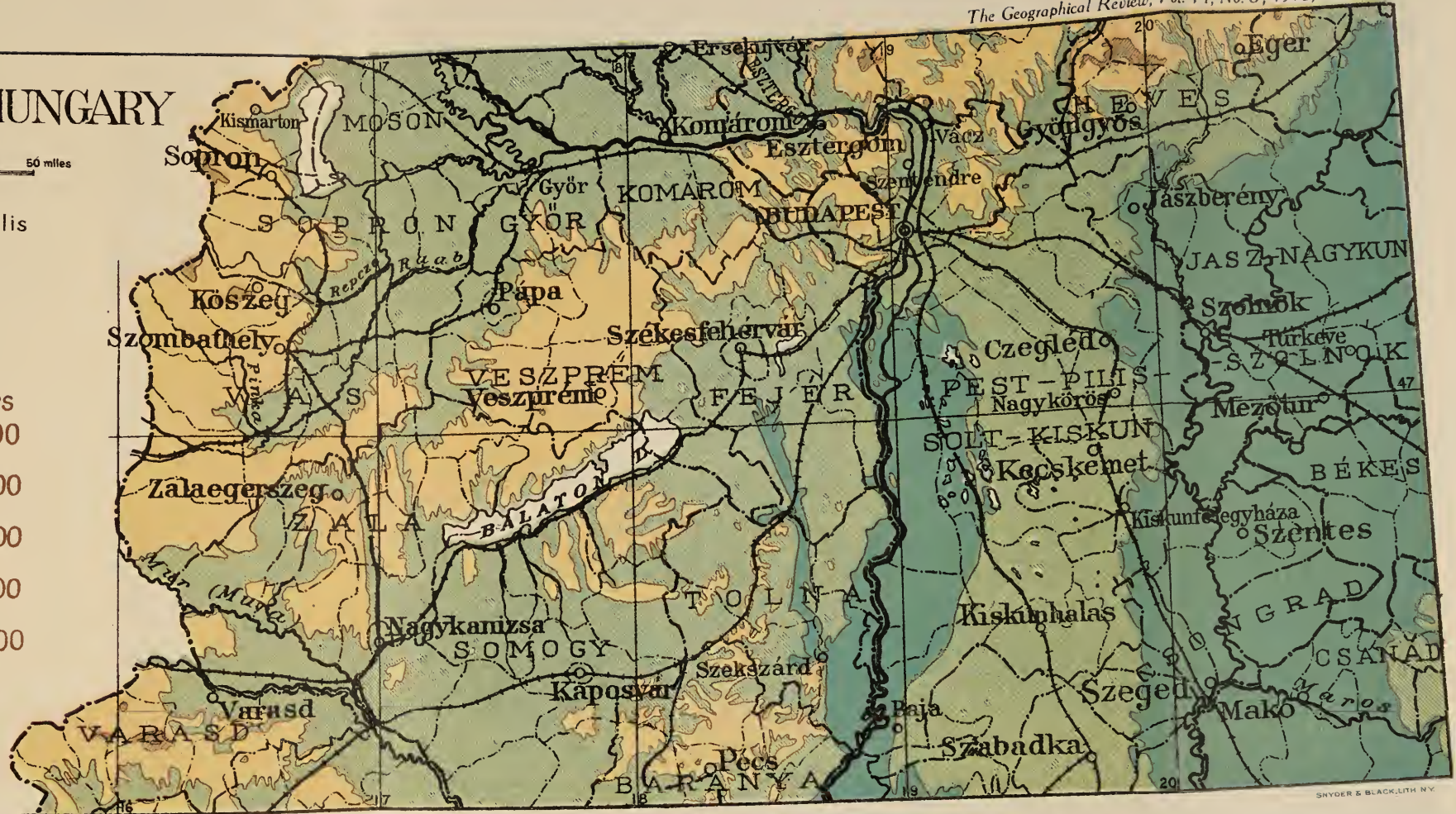
Scale 1:2 000 000
0 10 20 30 40 50 miles

Geographical Data
Compiled by B. C. Wallis

- Boundaries
- National
- County
- District and Municipality

RELIEF

feet		meters
0 - 330		0 - 100
330 - 660		100 - 200
660 - 2000		200 - 600
2000 - 3300		600 - 1000
over 3300		over 1000



WEST-CENTRAL HUNGARY

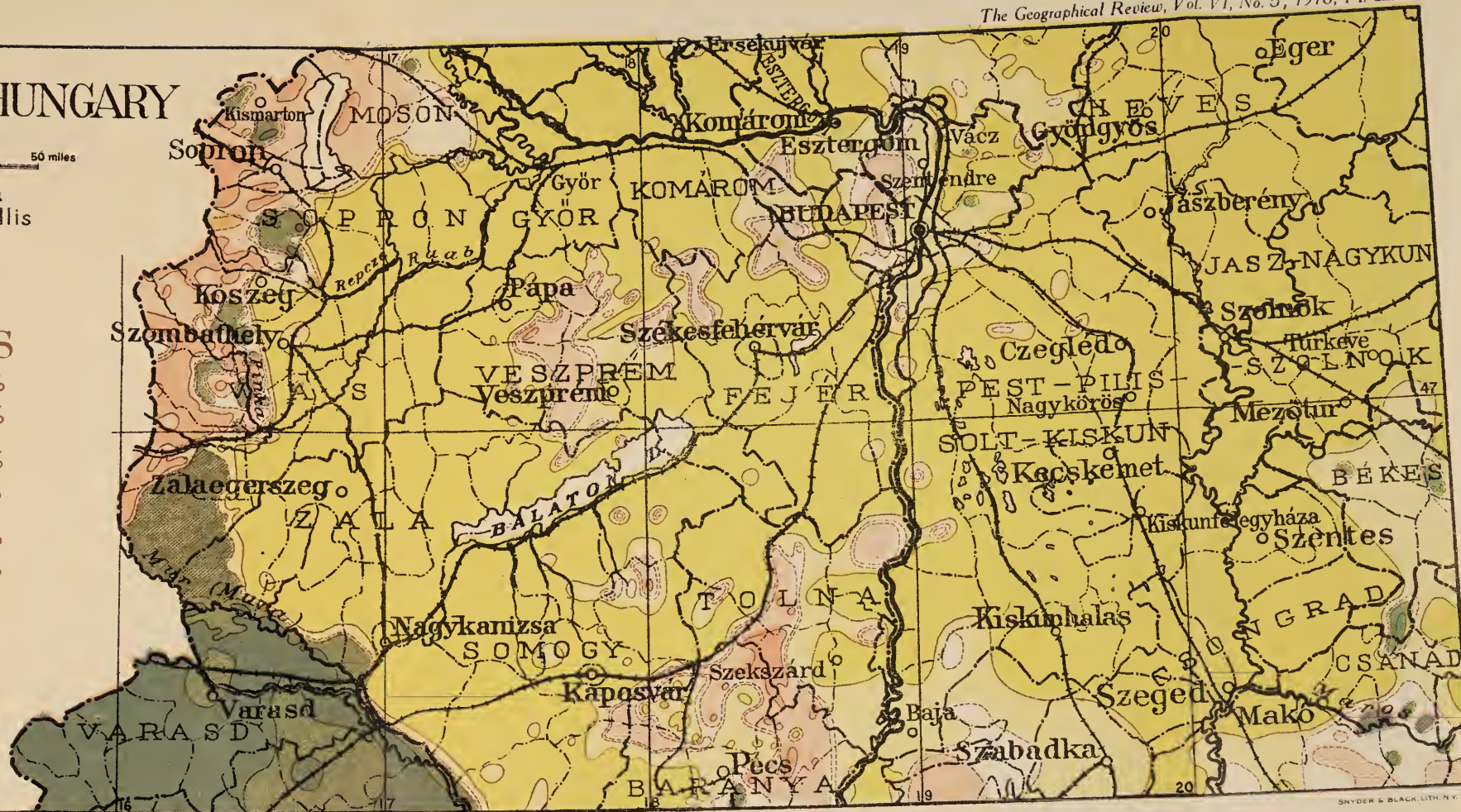
Scale 1:2 000 000
0 10 20 30 40 50 miles

Geographical Data
Compiled by B. C. Wallis

Boundaries
--- National
--- County
--- District and Municipality

NATIONALITIES

Magyars	50 - 95%
	over 95%
Germans	50 - 95%
	over 95%
Slovaks	50 - 95%
	over 95%
Rumanians	50 - 95%
Slovenes	50 - 95%
Croats	50 - 95%
	over 95%
Serbs	50 - 95%









WEST-CENTRAL HUNGARY

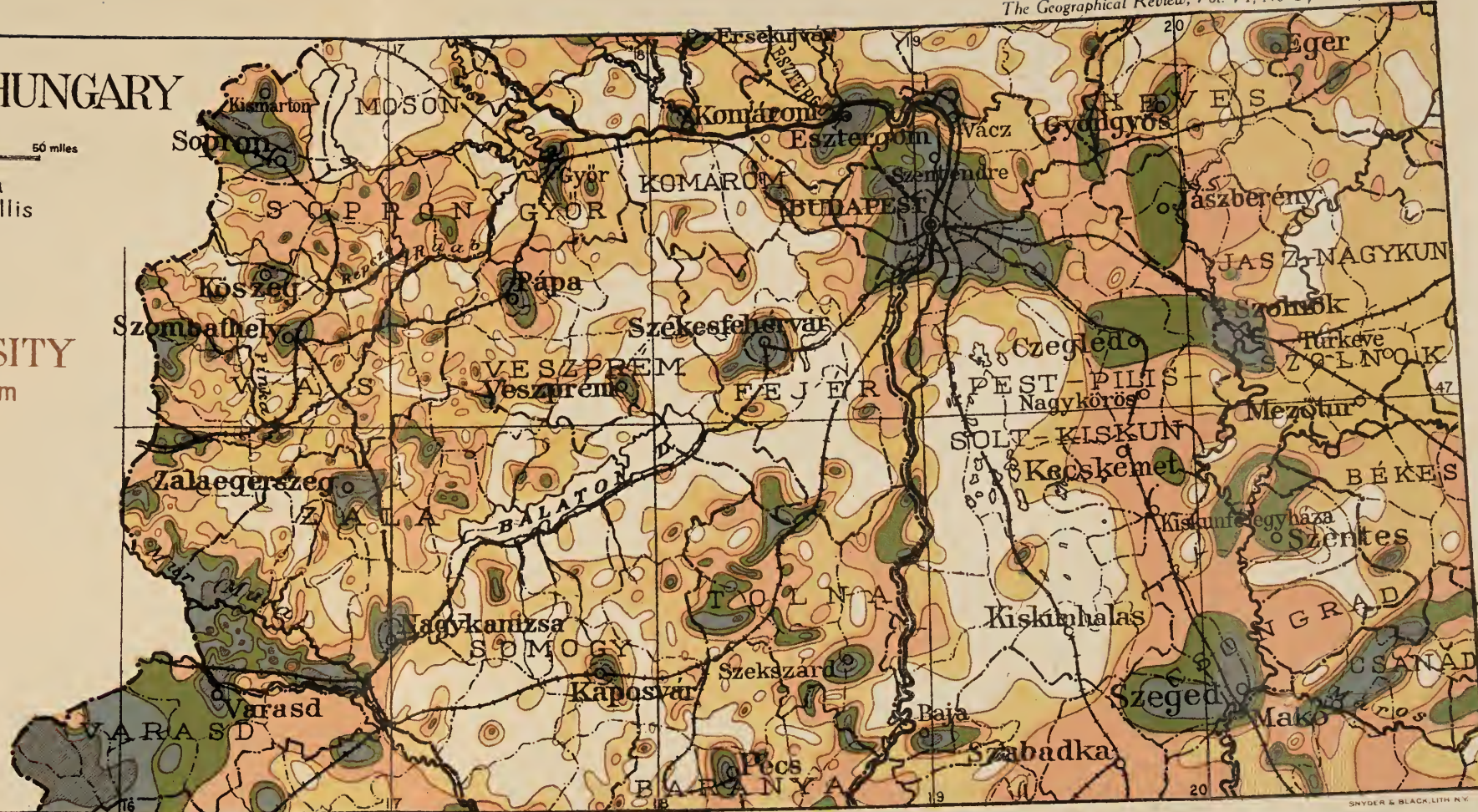
Scale 1:2 000 000
0 10 20 30 40 50 miles

Geographical Data
Compiled by B. C. Wallis

- Boundaries
- National
- County
- District and Municipality

POPULATION DENSITY

per sq. mile		per sq. km
0-128		0-50
128-192		50-75
192-256		75-100
256-320		100-125
320-384		125-150
over 384		over 150



These paragraphs, published about half way through the period under review, present a picture of the state of affairs in Hungary which has been euphemistically described as "misleading."

HUNGARIAN LIBERTY VS. BRITISH

One of the curious claims made by the Magyar official is to the effect that the constitution of Hungary is, after that of the United Kingdom, the best example of a constitutional monarchy in the world; it is claimed that the Hungarian is as free as the Briton, that in Hungary liberty rules. Unfortunately the Hungarian constitution differs from that of Britain; it is written, while the British constitution is unwritten; and, being written, it is as inoperative as one of the historic "scraps of paper." It is sometimes urged that the treatment of the "subject races" by the Magyars is paralleled by the case of the Irish in Britain. Two facts will demonstrate the falsity of this view. In the British Parliament the Irish are over-represented in proportion to population; their votes may be cast upon all questions, while the votes of the deputies from Croatia-Slavonia are limited to local affairs. In the Hungarian Parliament the best representation in recent years which the Rumanians have had has been 11 members out of over 400; and no other "subject race" has ever had so many. The second fact has a direct bearing upon the war; the "subject races" are conscripted for the army; they have since the outbreak of war been officially murdered by hundreds in the Slav areas; no Irish have yet been conscripted in Britain. Irish, Welsh, and Scots achieve great things for their respective countries by constitutional agitation in the British Parliament; neither Rumanians nor Slovaks are allowed to agitate constitutionally in Hungary.

THE MAGYAR ANOMALY

The Magyar race is an example of a curious geographical development; it has seen changes in the character of a people to suit the human environment by which they are surrounded, and its history is a record of failure where the original characteristics of the race have not been modified. Originally steppe horsemen, this people has settled to the tenure of land and agriculture. The ownership of land is a Magyar passion. Estates are large; and, although crops are cultivated, the traditional devotion to horses and horse-breeding still occupies much attention. Arrogant, as befits one of a race of alien conquerors, the poorest Magyar, even though he be a landless man, holds himself as the superior, though he be in rags, of the non-Magyar farmer whose peasant industry has enabled him to amass a considerable fortune.

The Magyar owes much to his situation within the ring of the Carpathians on the puszta—the westward extension of the great Eurasian steppe—but he owes more to the fact that his language is unique in type among the languages of Europe; both circumstances have tended toward

the consolidation of many nomad tribes into one settled nation. On the one hand these mountains and this speech have screened him from the influence of outsiders; on the other hand they have tended to force him into an isolated outlook upon Western civilization and have prevented Western influences from penetrating into the land: the continuous fighting with the Turks in the early days of Magyar history has further forced the attention of the Magyars eastwards and away from the west. Consequently, the Magyar has failed to reach the standards of government which prevail in Western Europe, his methods involve positive oppression against all active non-Magyar influences, and negative indifference and neglect wherever the non-Magyars are least numerous and least active.

Because his home is within the great border zone wherein Western and Eastern civilizations have most frequently clashed, his neighbors belong to many races; and he holds sway within his Carpathian fence because his numbers exceed those of any other single race in Hungary and because he has been able to keep the subject races settled in separated groups upon the surrounding hills; he has had throughout his history the strategical advantage of the interior lines and the possession of the heart of the land.

THE CASE OF THE SUBJECT RACES IN HUNGARY

In these articles an attempt has been made to lay bare the skeleton of the Hungarian Kingdom; they have been designedly confined to hard material facts, and the geographer must clothe the bones with the palpitating flesh of modern life. Nominally the serfs were emancipated in 1848, but in reality Hungary still retains many of the elements of social life which are characteristic of the Middle Ages. The Magyar boasts of the liberal character of his constitution, yet in truth there is little liberty for anyone but a Magyar. The subject races have neither freedom of the press nor the right of association; they lack even freedom of speech in official matters and in the courts. The achievement of personal ambition is barred to all who are unwilling to drown their nationality and submerge the inheritance they have received from their ancestors under the waters of Magyar autocracy.

The emergence of Western Europe from feudalism depended largely upon the development of the modern systems of land tenure; the Magyar has not delivered even his own people from the tyranny associated with the feudalistic holding of large estates in a single hand, so that many Magyars emigrate to escape the harshness of the agrarian situation. Necessarily this economic difficulty presses with greater severity upon the subject peoples.

It might be argued that the subject races are not fitted by their training and education to develop into political states fit to occupy a place in a regenerated Europe. To this there can be but one reply: the future state can hardly be worse than their present condition, in which they are at the

mercy of a bureaucratic party which causes them to be slaughtered to preserve a specious tenure of territory and a false ideal of liberty. Whatever may be said of the past and present of the non-Magyars, they have never yet had the opportunity for the development of a free national life and a guaranteed political unity; they have suffered, and still suffer, through the shortcomings of the Magyar ruling caste; for behind the whole Magyar question is hidden the Jewish question. The Magyar has failed to develop with the progress of the modern world; finance and commerce have displaced the possession of land as the chief factor in economic development, and the Magyar has failed as a financier and man of commerce, so that the whole kingdom suffers directly or indirectly from the dominance of the Jew. Hotel-keeper, money-lender, mortgagee of landed estates, employer of labor in the towns, a German or a Magyar to suit the necessities of his local situation, the Jew holds Hungary in thrall.

Victims both of the defects and the better qualities of the Magyars, the Rumanians and the Slavs have lacked opportunity and have been denied liberty to a degree which it is difficult for a Briton or an American to appreciate. The fundamental issue is plain. Shall they be guaranteed an opportunity; shall they have a chance of liberty?

THE EFFECTS OF THE WAR

The following facts are taken from the Presidential Address by Sir Bernard Mallet delivered to the Royal Statistical Society, London, in November, 1917.

Before the war there were over 200,000 marriages a year in Hungary; they have declined to less than 70,000 a year; "taking an average of marriages in Hungary, the effect of the war has been that over 600,000 people who in the ordinary course would have married have not done so." The number of births per annum is less than half the normal number, so that Hungary has lost in births a million and a half people, approximately 7 per cent of the mean population. This loss in potential lives is seven times as great as the loss from the same causes in the United Kingdom. Excluding the deaths of members of the fighting forces the excess of deaths over births in Hungary was over 50,000 in 1915, 90,000 in 1916, and 50,000 in the first half of 1917; and it has been estimated that by the end of 1916 there had been 700,000 deaths among the Hungarian fighting forces.

It is obvious, even under the vain supposition that the decimation of the populace has been evenly spread over Magyars and non-Magyars alike, that the war has made tremendous differences in the distribution of the people of Hungary and that any post-war settlement based upon the wishes and votes of the nationalities concerned will necessitate an elaborate census of the existing situation. The maps and tables provided in these articles may, however, serve as a useful guide to the probable results and as a standard of comparison to test the accuracy of the new determination.

THE DISCOVERY OF YUCATAN IN 1517 BY FRANCISCO HERNÁNDEZ DE CÓRDOBA

By MARSHALL H. SAVILLE

It has been justly stated by H. H. Bancroft that "prior to 1517 almost every province of the eastern continental seaboard, from Labrador to Patagonia, had been uncovered, save those of the Mexican gulf, which casketed wonders greater than them all. This little niche alone remained wrapped in aboriginal obscurity, although less than forty leagues of strait separated the proximate points of Cuba and Yucatan."¹

It seems certain that the Gulf of Honduras was first discovered by Columbus, on his fourth and last voyage in 1502. On this voyage he reached the so-called Guanaja Islands off the Honduras coast and from there went eastward, skirting the Central American coast to Panama. We shall not enter into the discussion of the question raised by Oviedo, who denies this discovery of Columbus and writes that "the gulf of Higueras [Honduras] was discovered by the pilots Vicente Yañez Pinçon, Juan Díaz de Solís, and Pedro de Ledesma with three caravels."² It seems apparent that Pinçon and Solís visited this region in 1508, after the news of the voyage of Columbus had been made public, and they probably saw the eastern shores of Yucatan on this trip. The date of the voyage is disputed, but we believe the year 1508, as given by Ferdinand Columbus,³ to be the right one, although Winsor⁴ and Bancroft⁵ incline to the date 1506, following Herrera, who has taken for his authority Las Casas, who does not mention, however, the exact year. Las Casas states that there was a

¹ H. H. Bancroft: *History of Mexico*, Vol. 1, 1516-1521, San Francisco, 1883; reference in Ch. 1, p. 2.

² G. F. de Oviedo y Valdes: *Historia General y Natural de las Indias*, edition of the Real Academia de la Historia, Madrid, 1852; reference in Vol. 2, Bk. 21, Ch. 8, p. 140.

³ Fernando Colón: *Historia del Almirante Don Cristóbal Colón*, edition of Colección de Libros Raros ó Curiosos, vi, Madrid, 1892, Vol. 2, Ch. 89, pp. 145-146. In this connection the reader is referred to the study by Dr. P. J. J. Valentini entitled "Pinzon-Solis 1508," in *Zeitschr. Gesell. für Erdkunde zu Berlin*, Vol. 33, 1898, pp. 254-282. In his "The Portuguese in the Back of Columbus" (*Bull. Amer. Geogr. Soc.*, Vol. 20, 1888, pp. 432-444; Vol. 21, 1889, pages 35-56, 167-196, 359-379) Valentini advances the argument that, immediately after the return of Columbus from his first voyage, the King of Portugal secretly sent a fleet of four vessels to the islands found by the discoverer in 1493. They reached the coast of Yucatan, and as a result of their explorations drew up a chart showing the result of their discoveries on the three sides of the peninsula. A map of 1501 has been used by Valentini to analyze the place names of the Portuguese survey of the Yucatan coast, two of the most significant being Conillo, identified by Valentini as Cozumello, and Kimpech, the Campeche of today. Valentini goes so far as to write, "the Portuguese in the year 1493 were the first, and Pinzon-Solis the second, discoverers of Yucatan."

⁴ Justin Winsor, in his "Narrative and Critical History of America," Vol. 2, p. 191, writes: "It should be remembered that Columbus on his fourth voyage had sailed along the coast from Cape Honduras to Nombre de Dios, and that Vicente Yañez Pinzon and Juan Diaz de Solis, coasting the shores of the Gulf of Honduras, had sailed within sight of Yucatan in 1506; and therefore that in 1508 the coast line was well known from the Cabo de S. Augustin to Honduras."

⁵ Bancroft, *op. cit.*, Vol. 1, p. 12.

disagreement about this voyage among the witnesses, some saying that after they reached the Guanajas and had discovered the Golfo Dulce, they followed the coast from the Guanajas,

and soon discovered a great bay to which they gave the name the great bay of Navidad, and from there they [went and] discovered the mountains of Caria and other lands beyond; and, according to what other witnesses say, they returned to the north. And from all this it seems without doubt that they discovered then a great part of the kingdom of Yucatan, only that afterwards there was no one who followed up that discovery, [and] nothing more was surmised of the edifices of that kingdom, where the land and grandeur of the kingdom of New Spain might easily have been discovered, until it was discovered from Cuba.⁶

The Discovery of Yucatan

The credit for the real discovery of Yucatan must be awarded to Francisco Hernández de Córdoba, who sailed from Cuba in

⁶ Bartolomé de Las Casas: *Historia de las Indias*, edition of Fuensanta del Valle and Sancho Rayon, Madrid, 1875, Vol. 3, Ch. 39, p. 201.

FIG. 1 (Upper)—The present coastline of the northeastern point of Yucatan to illustrate the site of Córdoba's landfall. Scale, 1:1,400,000. Based on U.S. Hydrographic Office Chart No. 966.

(Lower)—Córdoba's route (conjectural) on his voyage of discovery of Yucatan, 1517. Scale, 1:30,000,000. Based on sources cited in footnotes 18 and 37.



1517 on a slave-raiding expedition⁷ and came to the northeastern point, where the Spaniards first came into contact with the ancient civilized people of Mexico and saw the stone buildings of the Mayas. From Cape Catoche Córdoba went around the peninsula as far as the present state of Campeche, and then he probably returned to Cuba by way of southern Florida (see Fig. 1).

ACCOUNTS OF THE EARLY WRITERS

The first printed account of Córdoba's discoveries is found in the fourth "Decade" of Peter Martyr, in Latin, piratically printed under the title "De Nuper Sub D. Caroli Insulis" in Basel in 1521.⁸ Then follow the long account in Oviedo, first printed in Seville in 1535, and the work of Gomara, first published in Zaragoza in 1552. The only description of this voyage which we possess written by one of the participants is that of Bernal Díaz del Castillo. It was not written until he was an old man, nearly fifty years after the events described had taken place, and was not printed until 1632. Meanwhile much had been written about the discovery and conquest of Mexico. The best modern account in English of Córdoba's expedition has been compiled by Bancroft in the first volume of his "History of Mexico." It is accompanied by references to nearly all of the original source material which has come to light. An excellent treatment of the subject is also found in the fourth volume of the scholarly "Historia Antigua y de la Conquista de México,"⁹ by the learned Mexican historian and geographer Manuel Orozco y Berra. The accounts of Prescott,¹⁰ Winsor,¹¹ and Fiske¹² are meager in comparison. Since the appearance of these works another early chronicle of New Spain has been brought to light, that of Cervantes de Salazar, which contains some details not found elsewhere.¹³ As a background for the narratives of the voyage of discovery of Juan de Grijalva in 1518, who followed up the discoveries of Córdoba, we have translated literally and give *in extenso* some of the statements of the early writers concerning motives underlying the despatch of the expedition under the leadership of Córdoba.

⁷ Justin Winsor writes that Velásquez, the Governor of Cuba, had distributed the slaves in that island to such an extent among his followers that the majority of the settlers were unable to get any slaves, "and in this predicament agreed with Francisco de Córdoba to go on a slave-raiding expedition to some neighboring islands." Bancroft notes that "opinion has been divided as to the original purpose of the expedition. As it turned out, it was thought best on all sides to say nothing of the inhuman and unlawful intention of capturing Indians for slaves . . . It seems clear to my mind that slaves were the first object and that discovery was secondary and an after-thought." In the light of the various testimonies which are quoted hereafter, it will be seen that Bancroft's conclusion is justified.

⁸ The fourth "Decade" of Peter Martyr, published in 1521, has been translated into English several times.

⁹ The "Historia Antigua y de la Conquista de México" was published in Mexico in four volumes in 1880. The account of the voyages of Córdoba, Grijalva, and Cortés will be found in Vol. 4.

¹⁰ W. H. Prescott: Conquest of Mexico, Vol. 1, Bk. 2, Ch. 1.

¹¹ Justin Winsor: Narrative and Critical History of America, 8 vols., Boston and New York, 1884-89.

¹² John Fiske: The Discovery of America, 2 vols., Boston and New York, 1892.

¹³ The fact that Francisco Cervantes de Salazar had written a history of New Spain was known, but the whereabouts of the manuscript, if indeed it had been preserved, was unknown until the end of 1911, when it was seen by Mrs. Zelia Nuttall in the Biblioteca Nacional, Madrid. Mrs. Nuttall communicated

LAS CASAS

We quote first from Las Casas, who writes that the expedition was formed

to go to attack the Indians wherever they might be found, or in the Lucayos islands, although they were already destroyed, as has been seen above; still, they thought that some hidden away might be met with, by chance [there], or in other parts of those discovered [islands].

After describing the preparations made to send out the ships, he relates that, while they were being provisioned in a port called Principe on the northern coast of Cuba,

the pilot Alaminos said to the captain Francisco Hernández de Córdoba that it seemed to him that in that sea to the west below the island [of Cuba]—and his heart led him to believe so—there should be very rich land, because when he went with the old admiral [Columbus], he being a boy, saw that the admiral was much inclined to navigate towards that part, with great hope that he should find [there] well-peopled land and very much richer than up to there [Honduras], and thus he affirmed it; and because he lacked the ships he did not proceed on that route, and he turned from the cape he called Gracias á Dios back of the province of Veragua. This said, Francisco Hernández, who was [a man] of great hopes and good spirits, assented to these words and determined to send to Diego de Velásquez for permission, so that, although they should go to attack Indians and bring them to that island [of Cuba], in case on their journey they should discover any new land, he would go with authority as lieutenant of the governor, who governed there for the King, which [permission] should be sent promptly, as Francisco Hernández who asked for it desired.¹⁴

The necessary permission was sent and they immediately set sail.

CERVANTES DE SALAZAR

Further details are found in the recently discovered "Crónica de la Nueva España" by Cervantes de Salazar. He writes as follows:

Diego Velásquez being governor of Cuba, Francisco Hernández de Córdoba, Cristóbal Morante, and Lope Ochoa de Caicedo, inhabitants of Cuba, fitted out three ships in the year 1516 [a mistake; the expedition sailed February 8, 1517]. Some say with the support of Diego Velásquez, who was very favorably disposed to carry on work of discovery; others say that it was at his expense. The end sought by the privateers, some say was to discover and trade (although it is more certain that it was for the purpose of bringing slaves from the islands of Guanajos near Honduras).

He goes on to give a different version of the reported conversation of the pilot Alaminos with Córdoba from that written by Las Casas. He states:

In this manner Francisco Hernández set out from the port of Santiago de Cuba, who,

her discovery to the Congress of Americanists at its session in London in 1912. It was published under the auspices of the Hispanic Society in a single volume in Madrid, 1914. After the meeting of the London congress the writer mentioned the subject of the finding of the manuscript to Francisco del Paso y Troncoso in Madrid. Señor Troncoso made the claim to the writer and Professor MacCurdy that he knew of the manuscript and had made a copy of it some time previous to the visit of Mrs. Nuttall to the Biblioteca Nacional. He published a part of the work under the title "Cronica de Nueva España escrita por el doctor y maestro Francisco de Salazar," Madrid, 1914, as Volume 1 of "Papeles de Nueva España compilados y publicados por Francisco del Paso y Troncoso." The second volume has not yet been published so far as the writer is aware. Señor Troncoso died a year and a half ago, and his literary effects have recently been sent to Mexico. There is a possibility that the second volume was printed and not issued.

¹⁴ Las Casas, *op. cit.*, Vol. 4, Ch. 96, pp. 349-350.

when he was on the high sea, declared his intention was different from what it had seemed. He said to the pilot, "I am not going to hunt Lucayos [Lucayos are Indians of ransom], but I am going in search of some good island in order to settle it and become governor of it. I am certain therefore that for my services, as well as the favor I have at court through my kindred, the King will grant me the favor of the governing of it. For this reason search with great care, for which I will repay you very well, and you will gain in all the advantages with all the other of our company." The pilot accepting the promises and offers, they went more than forty days, ploughing the sea, and did not find anything that seemed good. One night at midnight, the ship having fair weather, the sea calm, the moon shining, the people sleeping, and the pilot wrapped up in a cloak, he heard the sound of wavelets against the sides of the caravel, and knew that he was near land. He called the chief pilot and told him to take soundings and see if he could find bottom.

They found twenty fathoms of water, and the chief pilot, Alaminos, went to Córdoba with the news saying,

"Señor, good news, for we are in the richest land of the Indies." The captain inquired, "How do you know it?" and he responded, "Because when I was a small cabin-boy of the ship in which the Admiral Colón went in search of this land, I had a little book that I had brought, in which it said that, encountering bottom in this direction in the manner in which we have found it, we should find a great land very thickly settled and very rich, with sumptuous buildings of stone in it, and this book I have now in my chest."¹⁵

AUTHOR OF "DE REBUS GESTIS CORTESII"

According to the author of the "De Rebus Gestis Ferdinandi Cortesii"

Seven years after the arrival of Velásquez and the Spaniards in Cuba, that is to say in 1517, the island being pacified, Francisco Fernández de Córdoba, Lope Ochoa de Salcedo, Cristóbal Morantes, old settlers in the island, and many other Spaniards renowned for their name and wealth, formed a company among themselves, and named Francisco Fernández de Córdoba as commandant of the expedition. They prepared four ships, loaded them with provisions and arms, and brought together men, arranging to leave on a fixed day in the direction of the Lucayas and Guanajas. The object was to capture by force or trickery those islanders, a people barbarous and wild, and to bring them to Cuba as slaves. These islands lie between the south of Cuba and the north of the cape of Honduras, as with little truth Gonzalo Fernández de Oviedo has written. At the time of leaving, the Adelantado Velásquez gave to Córdoba and his companions a vessel, [one] of those which were used to carry provisions to the Indians of the mines, under the condition that he would be given a part of the Guanajas [Indians] who would be captured. After the ships had left and were distant from the port, there came up very strong and contrary wind, so that in place of arriving at the Guanajas, which was where they were going, they came to stop at the point of Mujeres.¹⁶

The Lucayas are the Bahama Islands to the northeast of Cuba, where Columbus made his first landfall. The Guanajas, as has been said, were discovered by Columbus in 1502, and are off the coast of Honduras, almost due south of the extreme western end of Cuba. Being in diametrically

¹⁵ Cervantes de Salazar, *op. cit.*, Bk. 2, Ch. 1, pp. 59-60.

¹⁶ The "De Rebus Gestis Ferdinandi Cortesii," written in Latin, probably by Juan Cristóbal Calvert de Estrella, between the years 1548 and 1560, was translated into Spanish under the title, "Vida de Cortés" and the Latin text with the Spanish translation was first published by the translator, Joaquín García Icazbalceta, in Vol. 1 of his "Colección de Documentos para la Historia de México," in 1858. Prescott made use of a copy of the original manuscript. Reference on pp. 558-559.

opposite directions from the island from which they set out, it would seem more probable that the expedition must have been intended for the Guanaja group. Furthermore, accounts agree that, after leaving Jaruco, near the present Havana, they sailed westward and rounded Cape San Antonio. Had they intended sailing to the Bahamas, they would not have sailed from Santiago de Cuba around to the north side of the island as far west as Havana and then gone still farther westward to the extreme end of Cuba. Leaving Santiago and rounding the eastern Cape Maisi, their course would have been due north, for the Bahama group is not far distant in this direction. Prescott makes the assertion that the expedition was bound to "one of the neighboring Bahama Islands,"¹⁷ basing his opinion apparently on the loose statement in the "De Rebus Gestis" just quoted.

BERNAL DÍAZ

Bernal Díaz, the only eyewitness of the expedition, states that the motive for the voyage was "in seeking and exploring new lands where we might find employment." He goes on to say that one of the vessels was "bought on credit from the Governor Diego Velásquez, on the condition that all of us soldiers should go in the three vessels to some islands lying between Cuba and Honduras which are called the Islands of Guanajas and make war on the natives and load the vessels with Indians, as slaves, with which to pay him for his bark." This proposition was refused, and the Governor fell in with their plan "to go and discover new countries." After the fleet left Cuba, on passing Cape San Antonio, a storm struck them which lasted two days and nights, and after the weather moderated, sailing for twenty-one days from the time they had left port, they sighted land "that had never been discovered before and no report of it had reached us."¹⁸

FIRST LETTER OF CORTÉS

A final statement regarding the motives for the trip is found in the so-called "First Letter" of Cortés, written from Vera Cruz in 1519. In it are mentioned the names of the three promoters of the expedition and that "these said persons sent two ships and a brigantine in order to fetch Indians from those islands" and "we believe, although we do not know it positively, that the said Diego Velásquez, Lieutenant of the Admiral, owned a fourth part of the fleet."¹⁹

¹⁷ Prescott, *op. cit.*, Vol. 1, Bk. 2, Ch. 1.

¹⁸ The original manuscript of the History of Bernal Díaz still exists in the Municipal Archives of Guatemala City, where the writer has had the great privilege of examining it. The first edition of 1632, from which later editions and translations have been made, is exceedingly faulty. An "autograph" edition was edited by Genaro García and printed in Mexico in 1904, from a photographic facsimile of the original manuscript presented by the President of Guatemala to the Mexican Government. From this first exact publication of Bernal Díaz, Alfred P. Maudslay has made a faithful translation, greatly enriched by notes, which gain added value from the fact that he has personally visited a greater part of the territory treated in the History. It has been published by the Hakluyt Society in five volumes (*Hakluyt Soc. Publs.*, 2nd Series, Vols. 23-25, 30, and 40, London, 1908-1916).

¹⁹ The first letter despatched by Cortés to the King of Spain, relating his adventures in 1518 from the time of his landing at Cozumel until he arrived off the coast of Yucatan, has been lost. Its place has been

TREATMENT OF CÓRDOBA BY VELÁSQUEZ

Authorities vary as to the number of days spent on the outward voyage: Las Casas states it as only four, Oviedo gives six, while, as has been seen, Bernal Díaz makes it twenty-one, in which he is followed by Herrera. Las Casas, who was a friend of Córdoba, does not mention the return of the expedition by way of Florida, as related by Bernal Díaz. He gives some interesting information concerning the shabby treatment received by Córdoba from Velásquez, when, animated by the sight of the gold objects brought back by the expedition, he began to fit out another expedition to return to Yucatan, under the leadership of his nephew, Juan de Grijalva. At the same time we must remember that Córdoba had been sorely wounded in a fight with the Indians and was hardly in a condition to set out again for the newly found lands. In fact he died within two weeks after reaching his home. How much his disappointment had to do with his early demise we do not know. He himself did not realize his serious condition, as will be seen by what Las Casas writes. He says:

This appointment grieved Francisco Hernández very much, and he received it as a great affront that Diego Velásquez had done it, because he had with his own money, if it was indeed his, made the fleet, with that of the other two, Cristóbal Morante and Lope Ochoa, establishing and making the discovery, and being placed in so many dangers by sea and land, and in the end coming out badly wounded. The enterprise, then, was his very own and apart from him pertained to no one. For which reason he determined to go to complain to the King about Diego Velásquez, and he wrote to me to this effect, I being then in Zaragoza, saying that Diego Velásquez had tyrannically defrauded him of the fruits of his labors and that he would not delay more than to be cured of his wounds, and to receive some funds for the expense, begging me that I would inform the King in the meantime of his affront. But he disposed to go to Spain, and God disposed to carry him to the other world. . . Finally, with this innocence like many others, our friend Francisco Hernández died.²⁰

The Landfall of Córdoba

DOCUMENTARY EVIDENCE

Regarding the place of the landfall of Córdoba the early writers are not at all in accord. Stephens writes regarding the first landing place that "navigators and geographers, however, have assigned different localities to this memorable point, and its true position is, perhaps, uncertain."²¹ It is the generally accepted idea that the landing was made on the island of Mujeres, and Mr. S. G. Morley, who coasted the peninsula in 1918, saw a small monument on the island erected by the Mexican Government in 1917 to commemorate the four hundredth anniversary of the discovery of Mexican territory by Europeans.

supplied by the letter sent by the newly established municipality of the town of Vera Cruz, founded by the Conqueror after his landing there. It contains a short account of the two previous expeditions as an introduction. It has been translated at least twice into English. We use the latest translation of Francis A. MacNutt, published in two volumes in New York, 1908; reference in Vol. 1, p. 127.

²⁰ Las Casas, *op. cit.*, Vol. 4, pp. 362-363.

²¹ J. L. Stephens: *Incidents of Travel in Yucatan*, New York, 1843, Vol. 2, p. 356.

BERNAL DÍAZ

Nevertheless, the old chronicler Bernal Díaz states that they first came to land where "from the ships could be seen a large town standing back from the coast about two leagues We named it Grand Cairo." He goes on to say that the cacique who came in a canoe to visit the ships "kept on saying in his language '*Cones catoche*,' which means 'Come to my houses,' and for that reason we called the land Cape Catoche, and it is still so named on the charts." Díaz, describing the sharp fight which took place here between the Spaniards and the Indians, says, "A short distance ahead of the place where they attacked us was a small plaza with three small houses built of masonry, which served as *cues* and oratories. These houses contained many pottery idols, some with faces of demons and others with women's faces."²² It is evident that this place was between the shore and the large town called Grand Cairo, but no mention is made of the name Mujeres being applied to any point in the immediate neighborhood. On the contrary, in describing the expedition of Cortés in 1519, Díaz writes that after leaving the island of Cozumel they came to the so-called bay between the island of Mujeres and the mainland, where they remained for a day and sent two boats to the shore; they found "farms and maize plantations, and some places where the Indians made salt, and there were four *cues*, which are the houses of their idols, and there were many idols in them, nearly all of them with figures of tall women, so that we called that place the Punta de Mujeres." This seems to identify clearly the island, and, so far as the testimony of Bernal Díaz is concerned, it is apparent that Córdoba did not go as far south as Mujeres on his voyage. The fact of finding women's figures and faces of pottery in both the vicinity of Cape Catoche and the island of Mujeres may have caused the confusion in the early accounts. Maudslay, in a footnote to his translation of Bernal Díaz, writes on this point that "Bernal Díaz says nothing about this locality [Mujeres Island] in his description of the two earlier voyages, but the author of the '*Itinerario*' says that Grijalva observed it after leaving Cozumel. As Grijalva could not possibly have had any information on the subject, it seems to show that the '*Itinerario*' was written at a later date than is usually assigned to it and gave this explanation to account for the name given to the locality by Cortés."²³ Cortés does not mention in his letter the landing at Mujeres alluded to by Bernal Díaz, but it is probable that they landed there, and there seems to be no reason why Grijalva should not have landed there, notwithstanding the silence on the subject of both Bernal Díaz and Juan Díaz, the author of the "Itinerary" of Grijalva, as Grijalva was at Cozumel, and Mujeres is between there and Cape Catoche.

²² Bernal Díaz, *op. cit.*, Hakluyt Soc. edition, Vol. 1, pp. 14-17.

²³ *Ibid.*, p. 105.

OVIEDO AND HERRERA

IN the letter of Cortés it is stated that Córdoba "arrived at the island of Yucatan at its uttermost point, which may be sixty or seventy leagues both from the said island of Fernandina, and from this rich land of Vera Cruz." Oviedo says that the expedition, after sailing some sixty or seventy leagues, came to the land of the province of Yucatan, "on the coast of which they saw low stone towers, which were mesquites or oratories of that idolatrous people. These edifices were placed on certain steps, and the towers were covered with thatched roofs."²⁴ Herrera's account is as follows: "They saw land at which they rejoiced much, and gave many thanks to God, and from the ships they saw a town that appeared to be two leagues from the coast . . . And an Indian said in a loud voice '*Conex catoche*,' that is to say 'Come to my houses,' and for this [reason] they gave the name Punta de Catoche to that point."²⁵ In his narrative of the voyage Herrera follows closely the story as told by Bernal Díaz. He describes the fight with the Indians and states that where it took place "there were three houses made of lime and stone that were oratories, with many clay idols with faces of demons, of women, and other bad figures." It will be noted that none of the writers cited—and they are our most trustworthy sources of information—give the island of Mujeres as the place of first landing of Córdoba, both Cortés and Oviedo being silent in the matter, and Bernal Díaz and Herrera being in accord in stating that the place was given the name of Cape Catoche.

GOMARA

IN the history of Gomara printed in 1552 we find the earliest definite published statement that the first land sighted was the island of Mujeres. He writes that the Spaniards first came to land where "there are some salt pits at a point called de las Mujeres, for there were there some stone towers with steps, and chapels covered with wood and straw, in which in pagan order were put many idols resembling women They did not stop there but went to another point that they called Catoche, where they saw some fishermen, who from fright or fear retired to land, and who responded '*Catoche, catoche*,' that is to say 'house,' thinking that [the Spaniards] asked where they were going. From this there remained the name of the cape of that land."²⁶ It is significant that Gomara says that the first place where the Spaniards landed was not at Mujeres but at Cape Catoche.

"DE REBUS GESTIS CORTESII"

IN the "De Rebus Gestis" we again find Mujeres mentioned as the first land seen by Córdoba. It is stated that after encountering a strong head

²⁴ Oviedo y Valdes, *op. cit.*, Vol. 1, Bk. 17, Ch. 8, p. 497.

²⁵ Antonio de Herrera: *Historia de las Indias Occidentales*, edition of A. Gonzales Barcia, Madrid, 1726-1730, Decade 1, Bk. 2, Ch. 17, p. 47. The first edition was published in Madrid in 1601-15.

²⁶ F. L. de Gomara: *La Historia General de las Indias*, p. 68. I quote from the edition of Martin Nucio, printed in Antwerp in 1554.

wind the Spaniards "came to stop at the point of Mujeres. They gave it this name because they found many figures of women or goddesses placed in a row in a temple. The building was of stone . . . Córdoba leaving there placed his prow towards the west and sailed as far as Cape Catoche."²⁷ If Córdoba placed his prow towards the west it must have been from Cape Catoche, for, if sailing from Mujeres, the course would have been north-northwest.

CERVANTES DE SALAZAR

Cervantes de Salazar narrates that after leaving Cuba the expedition came into shallow water one night, and "at ten o'clock in the morning with great joy they sighted land and came to the weather side of a small island that was called Cozumel on account of the great quantity of honey which was there."²⁸ He says that no landing was made there and makes the mistake of having the fleet come to anchor some thirty leagues up the coast towards Mexico in the "land of Lazaro." This stop was not made until after the fight in the vicinity of Grand Cairo described by both Bernal Díaz and Herrera, the land of Lazaro being in Campeche. Las Casas also makes the blunder of saying that "they arrived at a large island called Cozumel, to which the Spaniards gave the name Santa Maria de los Remedios."²⁹ There is no doubt whatsoever that Cozumel was not seen by Córdoba and was not discovered until the next year. Bernal Díaz says that the name Santa Cruz was given to the town discovered on Cozumel because they first entered it on the day of Santa Cruz. The chaplain Juan Díaz does not restrict the name to the town but writes: "and because the day was that of Santa Cruz we gave that name to the land."³⁰ The name Santa Maria de los Remedios was the name given to Yucatan when that land was still supposed to be an island and was never applied to Cozumel as stated by Las Casas.

With a single exception, all later writers on the subject have taken the authority of Gomara, Torquemada,³¹ and others, and the island of Mujeres has been credited as being the spot where the first landing was made.

²⁷ Work cited in footnote 16, p. 559.

²⁸ Cervantes de Salazar, *op. cit.*, p. 60.

²⁹ Las Casas, *op. cit.*, Vol. 4, Ch. 96, p. 350.

³⁰ The "Itinerary" of Grijalva, written by the chaplain of the fleet, was published in Italian by Ludovico de Varthema in the work entitled "Itinerario de Ludovico de Varthema Bolognese ne lo Egypto, ne la Syria, ne la Arabia Deserta et Felice, ne la Persia, ne la India, et ne la Ethiopia, etc.", edition printed in Venice by Zorzi de Rusconi in 1520. It was translated into French by Ternaux Compans and published in Vol. 10 of his "Voyages, Relations et Mémoires Originaux Pour Servir à l'Histoire de la Découverte de l'Amérique," Paris, 1838. A translation into Spanish was published by Icazbalceta in his "Colección de Documentos para la Historia de México," Vol. 1, pp. 281-308, with parallel Italian text. This has been translated into English by the writer and will appear as Vol. 3 of the publications of the Cortés Society.

³¹ Torquemada writes that Córdoba "discovered the land of Yucatan, a coast until then unknown and undiscovered by us Spaniards, where upon a headland there were some very large and good salt mines. It was called Las Mujeres, because there were stone towers, with steps, and chapels covered with wood and straw, in which many idols that appeared to be females were arranged in a very artificial order." I

ARCHEOLOGICAL EVIDENCE

Areheological evidence should throw some light on the problem. The island of Mujeres is about five miles long, half a mile wide, and about five miles distant from the mainland (see Fig. 1). Steamers to Belize now pass close to the southern point of the island, with the small ruined temple at the extreme end of the point in full view. The ruins have been studied and described by Stephens,³² the Le Plongeon,³³ and Holmes.³⁴ Stephen Salisbury in a note to an areheological communication made by Dr. Le Plongeon to the American Antiquarian Society in 1878 calls attention to "the remarkable agreement in the number of buildings mentioned by Herrera with the number found by Dr. Le Plongeon in a more or less ruined condition as shown in his plan."³⁵ In a later letter Le Plongeon writes: "You will see in my communication on the Isla Mujeres that I have found the three houses made of stone and lime that were the oratories of Herrera."³⁶ Since the first coming of the Spaniards this southeastern portion of the island has been slowly washed into the sea, and the temple, on a bluff about fifty feet above the sea, as shown on the plan of Le Plongeon, has lost its eastern wall and part of the room.

On the mainland opposite this point are the extensive ruins, now called El Meco, which have been visited by the explorers mentioned above. It is close to the sea at present and, if it were not for the testimony of Bernal Díaz, might well be the Grand Cairo seen by Córdoba. It would be two leagues from the point of Mujeres, but not two leagues back from the coast.

Close to Cape Catoche is the small island of Contoy, about four miles long, low and sandy, upon which no ruins are reported. Cape Catoche is not the mainland now, it being a low sand spit separated from the mainland by a shallow channel a quarter of a mile wide. It is possible that it was connected with the mainland in the early part of the sixteenth century, as the early maps do not represent it as an island. In his itinerary of Córdoba published in the new translation of Bernal Díaz, Maudslay places Grand Cairo on the mainland near Cape Catoche, following the statement

quote from the second edition, printed in Madrid in 1732. The first edition is so rare that the date of printing is in dispute. A. Gonzales Barcia was the editor of the second edition. In the preface we read that the original manuscript which served for the first edition was in his library, and the place and date of printing are given as Seville, 1615. Prescott gives this date, but Clavigero puts it as 1614, and we find it in other places as 1612 and 1613. The statement about Mujeres above quoted is in Vol. 1, Bk. 4, p. 349.

³² Stephens, *op. cit.*, Vol. 2, pp. 415-417.

³³ Stephen Salisbury: Terra Cotta Figures from Isla Mujeres, Northeast Coast of Yucatan, with illustrations, *Proc. Amer. Antiquarian Soc.*, Worcester, 1878, pp. 32-53. An important paper describing the discoveries of Dr. and Madame Le Plongeon.

³⁴ W. H. Holmes: Archeological Studies Among the Ancient Cities of Mexico, *Anthropol. Series Field Columbian Museum*, Vol. 1, No. 1, Pt. I, Monuments of Yucatan, pp. 56-63, Chicago, 1895.

³⁵ Paper cited in footnote 33, p. 34.

³⁶ Augustus Le Plongeon: Archaeological Communication on Yucatan, *Proc. Amer. Antiquarian Soc.*, Worcester, 1878, p. 57.

of the old chronicler.³⁷ This portion of Yucatan has escaped the careful investigation of the archeologist. The only explorers who have attempted to examine this region, Arnold and Frost,³⁸ did not attack the problem of the location of Grand Cairo. This portion of the coast is shrouded with a dense tropical forest which comes to the very edge of the sea. The remains of ancient settlements lie in an almost impenetrable jungle, and many ruined buildings have been reported, but no group has yet been discovered deserving the name Grand Cairo. A Spanish settlement was made here in early times, and the ruins of the church were reported by Stephens, who, however, did not visit it. It was examined by Arnold and Frost about ten years ago and is near the very spot where Grand Cairo should be located. So far as archeology is concerned, it is seen that the evidence is conflicting. With an exhaustive archeological survey of this region should go a careful examination of the physical changes which have taken place along this coast during four centuries.

CARTOGRAPHICAL EVIDENCE

Of the earliest maps which we possess showing the coast of Yucatan that published by Apianus, printed in Venice in 1520, is the oldest. Mujeres is represented under the name *p: de magieles*.³⁹ In 1524 it is shown on a map as *y. de mueres*;⁴⁰ in 1527 it appears as *y: de mujeres*;⁴¹ in the map of Ribero of 1529 it is given as *d'mugeres*,⁴² and in the chart of Alonzo de Santa Cruz, made about the year 1538, it is spelled *y^a. de mugeres*.⁴³ Between Mujeres and Contoy is an island now known as Isla Blanca. On both the Ribero and Santa Cruz maps Contoy is placed well south of Cape Catoche, and between Contoy and Blanca is the name

³⁷ In the translation of Bernal Díaz by Alfred P. Maudslay (see footnote 18).

The itinerary of the expedition under Córdoba as worked out by Maudslay (Vol. 1, p. lxiii) is:

Feb. 8, 1517	Santiago de Cuba
	Axaruco (Jaruco)
	Gran Cairo, Yucatan (near Cape Catoche)
Sunday, day of San Lázaro	Campeche (San Lázaro)
	Chanpotón (or Potonchan)
(Return Voyage)	Estero de los Lagartos
	Florida
	Los Martires—The Shoals of the Martyrs
	Puerto de Carenas (the modern Havana)

³⁸ Channing Arnold and F. J. T. Frost: *The American Egypt: A Record of Travel in Yucatan*, New York, 1908. The only part of this work which merits attention is the record of the trip made from Tizimin to the northeast corner of Yucatan and to the islands and adjoining mainland (pp. 118-184).

³⁹⁻⁴² The references to the early maps are taken from the work of Orozco y Berra: *Apuntes para la Historia de la Geografía en México*, published as Vol. 6 of the *Anales del Ministerio de Fomento de la República Mexicana*, Mexico, 1881. This monument of patient industry of the learned *licenciado* must not be overlooked by the student in search of information concerning the early geography of Mexico.

⁴³ The "El yslario general de todas las yslas del mundo enderesçado a la S. C. C. Magestad del Emperado y Rey nuestro Señor por Alonzo de Sancta Cruz su cosmógrafo mayor" was published for the first time, under the editorship of Fritz R. von Wieser, in Innsbruck, 1908, in honor of the Vienna session of the International Congress of Americanists. The part published of the general work, as noted by the title, is the fourth part, relating to America.

The map of Ribero noted in footnote 42 has been published by Edward L. Stevenson in his portfolio of "Maps Illustrating Early Discovery and Exploration in America," New Brunswick, 1906, in an edition of 28 copies.

Amazonas. This name is suggestive of Mujeres, and it may have been applied in the earlier maps in the same connection. Cape Catoche, on these early maps, is a point on the mainland and not an island.

CONCLUSION

The cartographical evidence, beginning with the very earliest map, of 1520, is therefore all in favor of the island of Mujeres. The earliest published statement, as has been said, is that of Gomara, published in 1552. Gomara was never in New Spain, but he was chaplain and secretary of Cortés in later years, hence in intimate contact with the conqueror. It seems strange, however, that the principal royal chronicler of the early part of the sixteenth century, Oviedo, with access to all the material and with the added advantage of having spent many years in the New World, where he talked with many of the participants of these early voyages, does not settle the matter. Indeed, Herrera, who came later as royal chronicler, must have had good reason for ignoring the statement of Gomara that Córdoba went to Cape Catoche after discovering Mujeres. The work of Bernal Díaz, the only eyewitness of the three first expeditions to Yucatan, in 1517, 1518, and 1519, was not begun until after the appearance of the work of Gomara, written, as he says, to correct the errors of that history. It was first printed, and then in an imperfect manner, in 1632. The other works cited, that of Cervantes de Salazar and the "*De Rebus Gestis*," remained in manuscript until recently. These manuscripts and that of Bernal Díaz, as well as others now lost, were undoubtedly consulted by Herrera. We cannot reconcile the distinct statement of Bernal Díaz concerning the location of the temple containing the images resembling women in the vicinity of Cape Catoche with the early christening of the island of Mujeres with that name, as found in all the early maps, the earliest one being printed before Cortés had completed the conquest of Mexico, in 1521. Hence we leave the problem unsolved as to the exact site of the first landfall in Mexico.

GEOGRAPHICAL RECORD

NORTH AMERICA

The Geographical Aspects of the Daylight Saving Act. The return to "normal" time throughout the United States at 2 A. M. on October 27 makes a survey of the geographical aspects of the Daylight Saving Act of March 19, 1918, of interest. Section 3 contains the essential provision of the act. It reads (*Monthly Weather Rev.*, Feb. 1918, pp. 75-76):

That at two o'clock antemeridian of the last Sunday in March of each year the standard time of each [time] zone shall be advanced one hour, and at two o'clock antemeridian of the last Sunday in October in each year the standard time of each zone shall, by the retarding of one hour, be returned to the mean astronomical time [i.e. mean solar time] of the degree of longitude governing said zone, so that between the last Sunday in March at two o'clock antemeridian and the last Sunday in October at two o'clock antemeridian in each year the standard time in each zone shall be one hour in advance of the mean astronomical time of the degree of longitude governing each zone, respectively.

What this means is admirably illustrated in a series of six diagrams in the *Monthly Weather Review* for February, 1918 (Pls. 19-21), on which are shown the hours of dark-

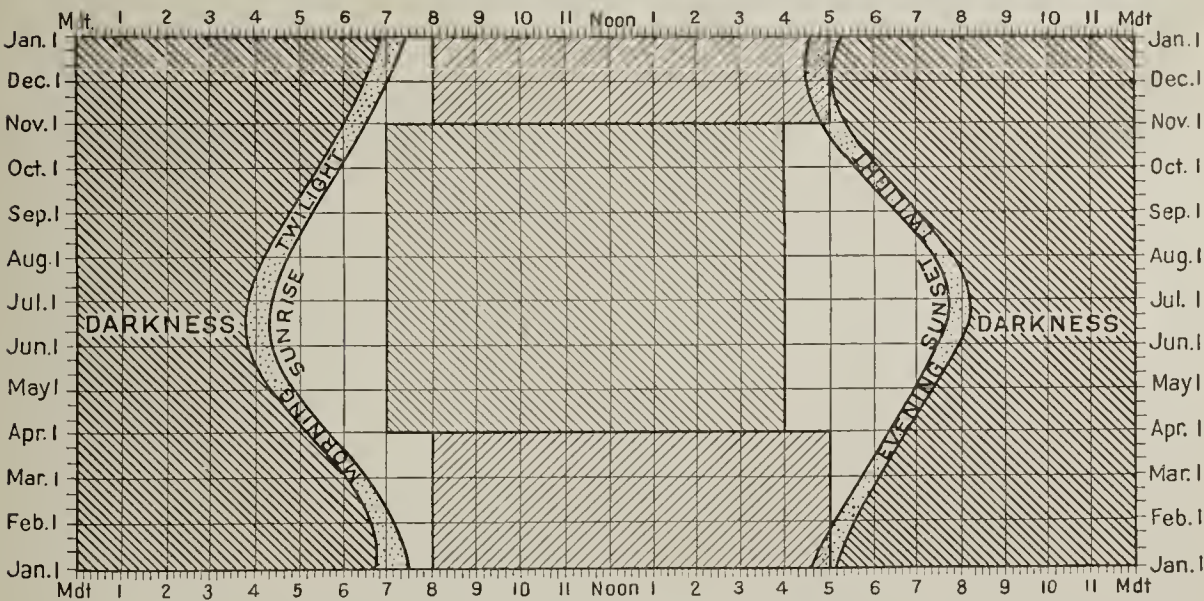


FIG. 1—Diagram showing the time of sunrise and sunset throughout the year in latitude 42° and the relation of the ordinary hours of industrial labor to the duration of daylight according to the Daylight Saving Act of March 19, 1918. (Reproduced from the *Monthly Weather Review*, February, 1918.)

The ruled blocks in the period of daylight show the working hours between 8 A. M. and 5 P. M. as advanced and retarded by the operation of the act. The stippled bands show the duration of twilight, i. e. the time elapsed between the position of the sun on the horizon and 18° below it. The diagram is "drawn on the basis of mean solar time. Accordingly . . . the hours of labor, etc., are depicted correctly with relation to local sunrise and sunset only for places whose geographic locations fall on or close to the standard meridian governing the time for any particular zone; that is, the diagram may be assumed to represent true conditions on the 75th, 90th, and other standard-time meridians. However, since each zone comprises a full hour of difference of time it necessarily results that the saving of daylight effected by the act is increased over that shown in the diagram for the more western portions of the zone up to half an hour or thereabouts and is correspondingly reduced in the eastern portions of each zone by an amount which becomes as great as half an hour or thereabouts."

ness and daylight, including twilight, for every sixth degree of latitude from 60° to 30°. The diagram for latitude 42° is reproduced herewith, as best representing the areas of densest population in the United States. An inspection of the diagram will confirm one's personal experience of the benefits of the measure—aside from its great value in the economic domain, such as the saving of fuel and the increased industrial

output. The longer continuance of daylight in the afternoon was especially noticeable in the spring and autumn, being equivalent in this latitude in April to about three instead of the customary two hours between the usual closing time of business, 5 P. M., and sunset, and to one hour instead of none in October. This gain was attained without any undue foreshortening of the morning hours of daylight, there being about two hours of daylight between sunrise and 8 A. M. in April and half an hour in October. On October 27 this margin had been narrowed down to about ten minutes, and by December 1 the sun would not rise until 8.50, altered time. This is an indication of the condition that would have obtained had the bill been passed which was introduced in the House of Representatives on October 7 to continue the measure throughout the year.

The six diagrams in the *Monthly Weather Review* are of great value to geographers in that they show the time of sunrise and sunset throughout the year in that zone of temperate climates within which dwells the greater part of progressive mankind. While these data can be computed with the aid of any ephemeris—a somewhat tedious process—graphical representations are rare. Such diagrams make it possible to visualize the length of sunshine in various latitudes—a factor of prime importance as regards climate, plant growth, and also for its influence on man. (For diagrams showing the insolation received in different latitudes see W. M. Davis: *Elementary Meteorology*, Boston, 1903, as well as Alfred Angot: *Traité élémentaire de météorologie*, 2nd edit., Paris, 1907, pp. 15 and 18; for maps of possible hours of sunshine in summer in Canada, see "Atlas of Canada," Dept. of Interior, 2nd edit., Ottawa, 1915, Pl. 67; for maps of actual duration of sunshine in various regions as modified by cloudiness, etc., see Bartholomew's "Atlas of Meteorology," London, 1899, Pl. 18.) For instance, the diagram for latitude 60° brings home strikingly the régime under which live the populations of such centers as Christiania and Petrograd, where daylight varies from barely six hours at the winter solstice (9 A. M. to 3 P. M., exclusive of an hour each of morning and evening twilight) to nineteen hours at the summer solstice (2.30 A. M. to 9.30 P. M., with one and a half hours each of twilight). Indeed, one of the noticeable features of the diagrams, viewed as a series, is the clear representation of the decreasing fluctuation between the two extremes with decreasing latitude.

Daylight saving laws of some kind have been passed in nearly all the middle latitude countries of Europe, as well as in Canada and United States. Though the measure was of English origin, having been proposed in the Sixth International Congress of Chambers of Commerce and Mercantile Associations which met in Paris in June, 1914, Germany led in adopting it, in 1916. France, England, Holland, Portugal, the Scandinavian countries, and Italy soon followed, putting it forward as a means of conserving fuel, of increasing the output of war supplies, and of affording to all an additional afternoon hour for recreation or other outdoor employment during the long summer days. The different governments have not yet, however, agreed upon a common date for making the change from one time to the other. Navigators, meteorologists, and astronomers have been exempt from the provisions of the law in England. (References: Sir Napier Shaw: "Summer Time" and the British Meteorological Office; also "Summer Time" or Daylight Saving in Other Countries, *Monthly Weather Rev.*, Feb., 1918, pp. 76-78; Miguel Barquero: *La llamada hora de verano y su aplicación á España*, 23 pp., Real Soc. Geogr., Madrid, 1917; G. F. Kunz: *Daylight Saving*, *Sci. Amer. Suppl.*, April 14, 1917, p. 237; *New York Times*, March 31, 1918, Section 4, p. 14.)

EUROPE

The Divergent Development of Industrialism in Britain and Germany. In an article "Some Aspects of the Industrial Revolution in Western Europe" (*Scottish Geogr. Magazine*, July, 1918, pp. 251-263) Miss Newbigin suggests certain differences in the development of industrialism between Britain and Germany. The late industrial epoch inaugurated by the industrial revolution of the later eighteenth century may be said to have occupied the last hundred years—from Waterloo to Serayevo. The earlier two-thirds of the epoch is characterized by the supremacy of Britain, the last third by the rise of the United States and Germany to the first rank. Favoring the early start and long lead of Britain were the insularity that spared her the Napoleonic turmoil of the Continent, the abundance and position of her coalfields, and her sea power. British industry arose in the Uplands, regions previously poor and figuring comparatively little in the national life. But though there was little to counteract the intoxicating force of the power of machinery and the new and sudden wealth it brought in the industrial regions themselves there was that stronger force of the *vieux monde* of traditional England—the metropolitan area. Under the influence of London the industrial areas of

the north and west have begun to create a tradition for themselves—in passing we may note the development of Manchester as a case in point. Concomitant with the growth of industrialism was the increase of population to a degree that, with the decline of rural life, meant overpopulation and emigration. The overseas colonies provided a means of escape from the industrial net and, at the same time, because of the closeness of the ties, a salutary influence on the mother country.

Thus, while the trend of modern industrialism, with its development of international capitalism and international socialism, seems to be aiming at a hegemony of the world, human life in Britain has still not lost altogether its old local basis. France has succumbed still less, and her regional life is vigorous. In Germany the ideal of advanced industrialism has progressed farthest (see Miss Newbigin's article in the present number of the *Review*, p. 417). In exact opposition to the sequence of events in England, it is the new rich region that has triumphed over the traditionally rich (cf. Dr. Fleure on Berlin, *Geogr. Rev.*, Vol. 3, 1917, pp. 399-401). Moreover, emigration of the individuals who would escape the net affords no such compensation to the homeland as Britain derives from her temperate-land colonies. Germany has sought industrial success by suppression of individuality and regionalism—quoting Friedrich Naumann ("Central Europe," English translation, London, 1916, p. 121), by "the death and surrender of the individual soul"; by the creation of a "living national human machine." It is a good omen for Britain, says Miss Newbigin (and we might add, for America, too), that in uniting with France for the defense of small nationalities, she is resisting the attempt to standardize the world.

The Utilization of Hydro-Electric Power in the French Alps. Already before the war a new economic life, based on the exploitation of hydro-electric power, had begun to transform the French Alps. By the displacement of French industry the war has greatly stimulated the process. The situation, viewed geographically, has been analyzed by Professor Raoul Blanchard of the University of Grenoble in a recent article entitled "L'industrie de la houille blanche dans les Alpes françaises" (*Annales de Géogr.*, Vol. 26, 1917, pp. 15-41). In an earlier paper, "L'état actuel de l'industrie en Dauphiné (région de Grenoble)" (*Recueil des Trav. de l'Inst. de Géogr. alpine*, Grenoble, Vol. 4, 1916, pp. 329-354), he has discussed in detail the progress of Grenoble and its immediate region, the heart of the new movement. Statistics for 1916 show the predominance of Grenoble. Out of a total of 738,000 horse-power for the entire region of the French Alps the Grenoble sub-region accounted for 231,000 horse-power. (For distribution in general, see map accompanying the article in the *Annales de Géogr.*; for detailed distribution round Grenoble, see map in "Guide Industriel du Dauphiné," published by the Chambre de Commerce of Grenoble, 1916.) The primary advantage of Grenoble lies in the combination of its Atlantic type of rainfall—more regular and abundant than that received on the Mediterranean slopes—with structural and morphological features facilitating both usage of water and communication.

The wartime growth, however, has only been achieved in the face of tremendous obstacles, against difficulties of securing raw material, shortage of transport and shortage of labor. Of the last M. Blanchard gives a particularly vivid picture in "Grenoble et sa région pendant la guerre" (*Revue de Paris*, Feb. 15, 1918). In 1913 the Grenoble sub-region (*arrondissements* of Grenoble and St. Marcellin) employed 38,000 workmen: at the end of 1917 that number had been raised to 50,000 in spite of war demands on the local male population. In pre-war days the only foreign workmen, with the exception of a few Spaniards, were Piedmontese, an ancient source of labor supply for France. Today the valleys resound to a most astonishing babel. There are refugees from all the invaded countries from northern France to Armenia. The colonies are represented by workers from Martinique, Morocco and Algeria, and Annam; the North Africans are described as a cheerful crowd but without enthusiasm for work, the Annamites as excellent and adaptive. The Chinese coolie, of whom so much has been heard, is there in numbers, and on his ability there is diversity of opinion, but he certainly is no practitioner of economy! There are German and Austrian prisoners, and the Slavs must be kept apart from Germans and Magyars—truly a motley crowd to make live and work together.

The growth achieved in these last four years has been in response to urgent necessity, but there need be no fear that it will not be maintained after the war. It has an established basis. One expression of it, typical of the French regional consciousness, is the creation of an economic region of the French Alps (*Commerce Repts.*, Jan. 3, 1918)—a forerunner of the task being undertaken for the whole of France by the Ministry of Commerce, on which the *Review* will report in a later issue. The movement was initiated by the Grenoble Chamber of Commerce, and its object is to assure "the rapid execution of all measures necessary to develop the hydro-electric industries, hotel and tourist enterprises, agriculture, and the exploitation of the forests."

AFRICA

The Vegetational Formations of South Africa. The possibility of constructing a phytogeographic map of South Africa is very appropriately considered by Professor J. W. Bews of Natal University College in the first number of the *South African Geographical Journal* (Johannesburg, 1917). South Africa offers peculiarly interesting conditions for phytogeographical research, a field but recently approached there. The first attempt to deal with the vegetation on an ecological basis was made by Marloth in "Das Kapland, insonderheit das Reich der Kapflora, das Waldgebiet, und die Karroo pflanzengeographisch dargestellt" (*Wiss. Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia," 1898-1899*, Vol. 2, Part 3, Jena, 1908), a work noteworthy for its cartographic representations of the botanical regions as conceived by earlier observers, Marloth's own map, and a set of remarkably fine vegetation photographs. A paper by Bews entitled "An Account of the Chief Types of Vegetation in South Africa, With Notes on the Plant Succession" (reviewed in the *Geogr. Rev.*, Vol. 4, 1917, pp. 76-77) gave a valuable general survey of the sub-continent, while a later paper, "The Plant Ecology of the Drakensberg Range" (reviewed on pp. 462-463 of this number of the *Review*) analyzes a section in detail.

In the present paper the principal South African vegetation types are discussed in relation to the proposed map. Bews recognizes thirteen main natural types in addition to types originating through human activities. Mapping of the forest area should not prove difficult, for the habitat is usually well defined—"southeastern slopes facing the rain clouds and sheltered from dry hot winds, with a loose, well-aërated type of soil." Outside the high forest are the less stable woodland types, *streambank bush* and *wooded kloofs*. These types are widely distributed in the center and west of the sub-continent, where over vast areas, as along the Orange River, they constitute the only form of woodland. In dry river valleys where climatic factors are adverse to forest growth a thorny succulent *scrub* is likely to represent the climax vegetation. Its chief species, including Acacias, Euphorbias, and Aloes, have deep tap roots, wherefore they succeed better than the most xerophytic grassland. *Macchia* (maquis) is the characteristic and well-known type of the southwestern region with its Mediterranean habitus, though it is also carried eastwards by the mountain ranges to the Drakensberg. The *grass veld* is the most extensive of all South African types. On the edges it merges into other formations. The *Karroo* represents the effect of a dry continental climate on grassland, grasses being largely replaced by succulent and dwarf shrub types. Between the *Karroo* proper and the *grass veld* is the *Compositæ veld*. The remaining types classed as separate formations are the *salt pan* vegetation, which covers considerable areas in the interior and west; the *vleis* (marshes) and *aquatic* types, the *alpine* and *coast line* types, and the *desert*. The last-named type needs careful definition. The so-called "Kalahari Desert" is for the most part open veld; true desert is found in the Namib, the coastal belt of the west.

The Geography of the West-Central Sinai Peninsula. Twenty years ago, in 1898-1899, the Geological Survey of Egypt carried out a reconnaissance survey of western Sinai (reported in T. Barron: *The Topography and Geology of the Peninsula of Sinai, Western Portion*, Survey Dept. of Egypt, Cairo, 1907). Manganese and iron ores were discovered in a section of the country. Commercial exploitation followed, and it was lately deemed necessary to survey the more interesting parts of the region in greater detail. This work was accomplished by Dr. John Ball in 1913-1914. His report has recently been published (*The Geography and Geology of West-Central Sinai*, Survey Dept. of Egypt, Cairo, 1916). The area in question, covering some 380 square miles, touches the Gulf of Suez a little south of Abu Zenima, 75 miles from Suez. At Abu Zenima the hills descend sharply to the sea, but farther south a gravelly coastal plain intervenes between the shore and a tract of mountainous country, highly eroded and deeply cut by canyon-like wadis whose walls may be several hundred meters high. North of the mountainous stretch is a sandy plain about 500 meters in elevation. It is characterized by a shrub vegetation, and in normal years numbers of camels and goats are pastured on it. The bold, sinuous Gebel el Tih escarpment—the edge of an intensely dissected limestone plateau—limits the plain to the north. The hydrographic relations of this plateau were not fully worked out, but south of the scarp all drainage is to the Gulf of Suez and the wadis here have been carefully mapped.

Running water, usually very brackish, is found among the palm groves of some of the wadis, but the total number of sources of potable water is very limited. A list of those of any importance enumerates only 16; this was during the dry years of 1913-1914. Some rain falls practically every year, generally in the form of a drizzle or gentle shower lasting but a few minutes. Occasional heavy rain storms fill the wadis. The

author witnessed one at which the Arabs manifested their joy by dancing about in the water. The larger floods are said to occur on an average of once a decade. Comparing the erosive power of these exceptional floods with the size of the wadis, Ball expresses the opinion that the rainfall was probably greater in Pleistocene times, but he believes that the change was not very great, certain erosional features showing that "the conditions of erosion have remained nearly constant for long ages."

The native population is grouped under many minor sheikhs in the wadis. Home-grown dates and imported maize form their chief foodstuffs; camels and goats constitute their wealth. During the dry years 1913-1914 many animals died, and the survey party found much poverty.

In regard to ore deposits it is stated that faulting has been a controlling factor in their genesis; hence the geological map and sections should prove valuable aids in exploitation. Chapter II of the volume, describing the survey operations, has a particular interest in that it deals with methods, some of them new, adapted to mountainous desert conditions.

ASIA

The Resources of French Indo-China, Especially Rice. The natural resources of French Indo-China, a monsoon land of diversified topography, are rich and varied. Before the war increasing use of these resources was shown in the trade figures of the country. In 1913, despite the losses sustained in the rice fields by the Red River flood, the total trade amounted to 500,000,000 francs (Georges Devraigne: *L'Indochine économique: Son mouvement commercial, ses principaux produits naturels*, 31 pp., Ministère des Colonies, Melun, 1917). But with resumption of normal conditions France looks forward to greatly augmented development of the natural wealth of this favored possession. M. Henri Brenier, author of the "Essai d'atlas statistique de l'Indochine française" (Hanoi, 1914), puts forward the possibilities in a pamphlet "Les ressources de l'Indochine et leur mise en valeur après la guerre" (66 pp., Ministère des Colonies, Melun, 1917; see also René Chudeau: *Le rôle économique de nos colonies pendant et après la guerre*, reprint from the volume of papers read before the Association Française pour l'Avancement des Sciences in 1918). There are the forests, with valuable hardwoods and a wonderful variety of sub-products—cinnamon, camphor, resins, lacs, oils, rubber; the fisheries, that now furnish one of the staple foods of home consumption and also export to China; the pastoral resources—cattle are now shipped to China and the Philippines; the cultivations, with tea and coffee, sugar cane, cotton, and tobacco as characteristic products—but above all rice.

French Indo-China ranks as the second rice-exporting country of the world; it is surpassed only by Burma. The yield varies considerably from year to year and with it the export, but for several years the mean export has exceeded a million tons. Yet the unsatisfactory condition of the industry is the subject of much inquiry by those interested in colonial development. Compared with the grain from other rice-exporting countries that from Indo-China is of poor quality, and its yield is likewise poor. Guillaume Capus, who reviews the question in the *Annales de Géographie* for January, 1918 (*Les riz d'Indochine: Production et amélioration*), estimates that by the inadequacy of the methods of cultivation and the inferiority of the commercial varieties the agricultural revenue of the country is diminished by at least 23,000,000 francs annually.

The varieties of rice, a grain of high antiquity of culture, are innumerable, and cultivations in Indo-China are very mixed; "not a single rice field in CochinChina but furnishes five or six varieties." The middlemen of the rice trade, usually Chinese who sail their junks up the inland waterways, buy from the individual farmers in small lots, for property, especially in the densely populated lands of the Mekong and Red River deltas, is very much broken up. There is no sorting of the varieties here or in the mill, nor does the grain receive adequate preparation for the western market. The greatest proportion finds its sale in China and Japan, the latter country using the inferior rice for domestic purposes and exporting the native rice of good quality. The mean yield of the crop in CochinChina, the greatest rice-producing section of the country, is 1,800 to 2,000 kilograms per hectare; in Spain and Italy we find yields of from 3,000 to 6,000. What can be done by experimentation is shown by the record yield of 6,611 kilograms per hectare at the experimental station of Buitenzorg, Java. This question of increased production on so favorable a terrain as Indo-China is important from other viewpoints than that of colonial revenue: with growing industrialization of the East there will be increasing demand for its staple food—rice.

GEOGRAPHICAL NEWS

PERSONAL

MR. THEODOOR DE BOOY gave a lecture before the Explorers Club of New York on October 11, entitled "An Exploration of the Sierra de Perijá, Venezuela." An account of Mr. de Booy's exploration of this region is published in the present number of the *Review*. Mr. de Booy will address the American Geographical Society on the same topic on December 17.

M. EMMANUEL DE MARTONNE, professor of geography at the Sorbonne, has recently arrived in the United States as the geographical member of a group of French scientists who will give a series of lectures in different parts of the country on various aspects of French life. Professor de Martonne's topics will be "Paris and the Paris Region" and "The Real France, Revealed in Its Scenery and Peoples."

DR. J. N. ROSE, assistant curator of the Division of Plants of the Smithsonian Institution, left in the late summer for Ecuador to make a botanical collection in the northern Andes. This is in connection with the general botanical survey of all of South America which the Smithsonian Institution has announced it is undertaking.

MR. VILHJÁLMUR STEFÁNSSON lectured in New York City under the auspices of the American Museum of Natural History and the American Geographical Society on October 31 on the Arctic expedition from which he has recently returned. The lecture, which was illustrated by colored lantern slides, dealt with the general aspects of Arctic exploration as experienced on his expedition. A narrative account of the last two years of the expedition, accompanied by a map showing the explorer's routes, was published in the October number of the *Review*.

PROFESSOR BAILEY WILLIS of Leland Stanford Junior University on October 21 addressed the New York Academy of Sciences on "The Physical Basis of National Development."

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

South Atlantic States

BROOKS, R. P. **The agrarian revolution in Georgia, 1865-1912.** 129 pp.; maps, bibliogr. *Bull. Univ. of Wisconsin No. 639.* Madison, 1914.

The emancipation of the negro and the devastation which had been wrought by the Civil War gave the people of Georgia some hard problems to face in 1865. Naturally the first step was an attempt to restore the old plantation system, with the addition of a money wage for the negroes. It was soon found, however, that except under the closest supervision the negroes' labor was worthless, that they were totally indifferent to the state of the crop and always ready to quit as soon as their wages were paid. After the failure of the money wage was demonstrated the share system was adopted. In this case the landlord supplied everything necessary to make the crop except the manual labor, and since he assumed the risk he claimed complete control over the tenant and crop as in the case of a day laborer. This control was, however, resented by the negro, and the feeling resulted in the growth of the custom of renting. In the latter arrangement, which still prevails, the negro supplies all his own capital, and the owner has no further care than to see to it that he gets the rent. Nevertheless the writer tells us that the planters as a class are strongly opposed to the renting system, saying that the average negro is incapable of successful farming except under direction and that the farm in his hands rapidly deteriorates, until he is obliged to give it up and recuperate himself with a period of share farming. By renting the negro avoids supervision, but his strongest reason for preferring renting is that it gives him unrestricted use of the mule nights and Sundays. He rides the animal over the country attending lodges and camp meetings—a use of the work animal with which the planter has never been able to sympathize. The proper feeding of stock, rotation of crops, the use of commercial fertilizers, and the planting of a kitchen garden are some of the things which the typical negro neglects utterly.

Altogether it is clear from Mr. Brooks's treatise that the Southern negro is a poor farmer. Nevertheless the author states that there is an element which is prospering—renters and landowners—as shown by the fact that in 1910 they were assessed for taxation in Georgia on over \$32,000,000 worth of property. Still, the mass of the race is unfit for economic independence and is sacrificing its best chance for well-being in seeking too rapid a release from a period of tutelage in industry. R. H. JONES

BATCHELDER, RUTH. **Beaufort of the real South, where the houses, the people, and the atmosphere have changed little since the days before the war; the plantation negro and his hectic religion.** Ills. *Travel*, Vol. 28, 1917, No. 4, pp. 28-31 and 47. [A pleasing account of Beaufort, "Queen City of the Sea Islands," between Charleston and Savannah. In addition to a historical sketch there is a description of the easy, indolent life of the present time. It is asserted that in St. Helena Island there are but 40 whites to 8,000 negroes.]

BESLEY, F. W. **The forests of Maryland.** 152 pp.; maps, ills., index. Maryland State Board of Forestry, Baltimore, Md., 1916. [The land area of Maryland, a little under 10,000 square miles, is classified as: improved farm land, 51 per cent; woodland, 35 per cent; waste lands, excluding salt marsh land (3 per cent), 11 per cent. The greater part of this waste land is probably suitable for forest planting. Details of the forest resources are given by counties. For each county there is a map showing forest areas by commercial type (hardwoods, softwoods, and mixed woods) on a scale 1:187,500.]

BUSHNELL, D. I., JR. **The Virginia frontier in history—1778.** Ill. *Virginia Mag. of Hist. and Biogr.*, Vol. 23, 1915, No. 2, pp. 113-123; No. 3, pp. 256-268; No. 4, pp. 337-351; Vol. 24, 1916, No. 1, pp. 44-55; No. 2, pp. 168-179. Richmond.

EMIGH, E. D. **The principles involved in predicting high-water stages in flashy streams, with special reference to the scheme for the Savannah River at Augusta,**

Ga. Map, diags. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 675-689. Washington, D. C., 1917.

HARPER, R. M. **A forest census of Alabama by geographical divisions.** Map. Reprinted from *Proc. Soc. Amer. Foresters*, Vol. 11, 1916, No. 2, pp. 208-214.

HARPER, R. M. **An inventory of Florida's forests and the outlook for the future.** Ills. Extract from *Quart. Bull. Florida Dept. of Agric.*, Vol. 26, 1916, No. 2, pp. 5-24.

HARPER, R. M. **A preliminary soil census of Alabama and west Florida.** Map. *Soil Science*, Vol. 4, 1917, No. 2, pp. 91-107.

HERRMANN, C. F. VON. **The climate of Atlanta, Ga.** 23 pp.; diags. Weather Bur., U. S. Dept. of Agric., Washington, D. C., [1916].

HEWETT, D. F., G. W. STOSE, F. J. KATZ, AND H. D. MISER. **Possibilities for manganese ore on certain undeveloped tracts in Shenandoah Valley, Virginia.** Maps, diags., index. *U. S. Geol. Survey Bull. 660-J*, pp. 271-304. Washington, D. C., 1918.

MCLEAN, F. T. **A preliminary study of climatic conditions in Maryland as related to plant growth** (under the direction of B. E. Livingston). Pp. 129-208; map, diags., ill., bibliogr. *Maryland Weather Service Special Pubs.*, Vol. 4, Part Ia. Also reprinted in *Physiological Researches; Preliminary Abstracts*, Vol. 2, 1917, No. 4. Baltimore, 1917. [The climatic factors with which this study deals are temperature, evaporation, and sunshine. Their combined effects on plant growth are compared for mountain (Oakland, western Maryland) and shore (Easton, on Chesapeake Bay) stations.]

RANDOLPH, ISHAM. **Reclaiming the Everglades of Florida.** Maps, ill. *Journ. Franklin Inst.*, Vol. 184, 1917, No. 1, pp. 49-72. Philadelphia.

SAMS, C. W. **The conquest of Virginia, the forest primeval: An account, based on original documents, of the Indians in that portion of the continent in which was established the first English colony in America.** xxiii and 432 pp.; maps, ill., bibliogr., index. G. P. Putnam's Sons, New York, 1916. \$3.50. 9½ x 6.

VAUGHAN, T. W., AND E. W. SHAW. **Geologic investigations of the Florida coral reef tract.** Map. *Year Book Carnegie Inst. No. 14 for 1915*, pp. 232-238. Washington, D. C.

— **Pinellas County, Florida, soil map.** 1 in. : 1 mile (1:63,360). [Accompanying "Soil Survey of Pinellas County, Florida," by G. B. Jones and T. M. Morrison, 7th Annual Report, Florida State Geol. Survey, 1915.] Tallahassee, 1915.

— [Topographic map of the United States.] Sheets: (1) Millsboro, Del.; (2) Lawtey, Fla.; (3) Macclenny, Fla.-Ga.; (4) Bladen, Ga.; (5) Kilmarnock, (6) Mathews, (7) Tappahannock, (8) Toano, (9) Urbanna, Va., (10) Ewell, (11) Heathsville, Va.-Md.; (12) Webster Springs, W. Va. 1:62,500. U. S. Geol. Survey, Washington, D. C., 1917, 1918. [Bladen, Lawtey, Macclenny, and Tappahannock sheets surveyed in co-operation with the War Department.]

Western States

SAMPSON, A. W., AND L. H. WEYL. **Range preservation and its relation to erosion control on western grazing lands.** 35 pp.; diags., ill. *U. S. Dept. of Agric. Bull. No. 675*. Washington, D. C., 1918.

SAUNDERS, C. F. **Under the sky in California.** ix and 299 pp.; ill. McBride, Nast & Co., New York, 1913. \$2.00. 8½ x 6. [A popular description of some out-of-the-way parts of California.]

SAUNDERS, E. J. **The physical geography of Washington.** Maps. *Journ. of Geogr.*, Vol. 14, 1915-16, No. 9, pp. 309-322.

SCHAFER, JOSEPH. **A history of the Pacific Northwest.** Revised edit. 323 pp.; map, ill., index. The Macmillan Co., New York, 1918. \$2.25. 8 x 5½.

SHANTZ, H. L. **Plant succession on abandoned roads in eastern Colorado.** Diags., ill. Reprinted from *Journ. of Ecology*, Vol. 5, 1917, No. 1, pp. 19-42. [Valuable not only for its description of the vegetational succession on old roads but also for its full account of the characteristics of certain of the plains roads and trails now abandoned.]

SMITH, W. S. **Physiography of the Skykomish Basin, Washington.** Diagr., ills. Reprint from *Annals N. Y. Acad. of Sci.*, Vol. 27, 1917, pp. 205-213. [This basin forms a part of the Cascade peneplane.]

SERLIN, O. B. **Washington forts of the fur trade régime.** *Washington Hist. Quart.*, Vol. 8, 1917, No. 2, pp. 102-113.

STEPHENS, FRANK, FORREST SHREVE, F. B. SUMNER, J. GRINNELL, AND G. D. LOUDERBACK. **Excursion impressions.** Map, ills. *Trans. San Diego Soc. of Nat. Hist.*, Vol. 2, 1916, No. 3, pp. 77-102. [Biogeographical notes of a short trip from San Diego to the border of the Colorado Desert.]

THIESSEN, A. H. **The weather and climate of Salt Lake City, Utah.** Map, diags. *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 205-225 (discussion pp. 224-225). Washington, D. C., 1917.

VAIL, C. E. **Lithologic evidence of climatic pulsations.** *Science*, No. 1178, Vol. 46, 1917, July 27, pp. 90-93. [Sandstones in northern Colorado.]

VESTAL, A. G. **Foothills vegetation in the Colorado front range.** Ills., bibliogr. *Botanical Gazette*, Vol. 64, 1917, No. 5, pp. 353-385.

WATERMAN, T. T. **The Yana Indians.** Pp. 35-102; map, ills. *Univ. of California Pubs. in Amer. Archaeol. and Ethnol.*, Vol. 13, 1918, No. 2, Univ. of California Press, Berkeley. [The last survivor (remaining in a primitive state) of this group of north-eastern Californian Indians died in 1916.]

WILLIAMS, I. A. **Some little-known scenic pleasure places in the Cascade Range in Oregon.** Map, ills. *Mineral Resources of Oregon*, Vol. 2, 1916, No. 1, pp. 7-114. Oregon Bur. of Mines and Geol., Corvallis. [“The particular purpose of this paper is to call attention to the economic importance of Oregon’s scenery by emphasizing the wealth of scenic advantages existing in parts of the Cascade range.”]

WILLIAMS, I. A. **The Columbia River gorge: Its geologic history interpreted from the Columbia River Highway.** Map, diags., ills. *Mineral Resources of Oregon*, Vol. 2, 1916, No. 3, pp. 7-130. Oregon Bur. of Mines and Geol., Corvallis.

WILLIAMS, M. W. **A fragment of the passing frontier.** *Hist. Teacher’s Mag.*, Vol. 6, 1915, No. 2, pp. 33-37. [A picture of early frontier life in the Coast Range of northwestern California.]

WOEHLKE, W. V. **The pump in a thirsty land.** Ills. Extract from *Sunset*, 1915, Oct., pp. 713-721. [Changes effected by irrigation in lands where formerly “a steer to every ten acres and a cowboy for every two hundred steers was the thirsty land’s carrying capacity.” Illustrations are taken from the Mimbres (N. M.) and Santa Cruz (Ariz.) valleys.]

WOOD, H. O. **California earthquakes.** Map, diags. *Bull. Seismol. Soc. of Amer.*, Vol. 6, 1916, No. 2-3, pp. 55-180. [A synthetic tabulation of all the recorded earthquake shocks of California and the bordering regions. The geographical location and circumstances of occurrence are set forth with a view to demonstration of their undoubted tectonic origin. (Compare note on “Seismic Activity in California During 1915” in the *Geogr. Rev.*, Vol. 1, 1916, pp. 456-457).]

WOOD, H. O. **The earthquake problem in the western United States.** Diagr. *Bull. Seismol. Soc. of Amer.*, Vol. 6, 1916, No. 4, pp. 197-217. [Considers the needs of field studies, laboratory work, and the establishment of seismological stations.]

YARD, R. S. **National Parks portfolio.** [Ten pamphlets of views, with six pages of introductory text, as follows:] (1) Yellowstone National Park, 31 views; (2) Yosemite National Park, 28 views; (3) Sequoia National Park, 27 views; (4) Mount Rainier National Park, 24 views; (5) Crater Lake National Park, 2 diags., 21 views; (6) Mesa Verde National Park, 27 views; (7) Glacier National Park, 25 views; (8) Rocky Mountain National Park, 30 views; (9) Hot Springs of Arkansas and certain other National Parks and National Monuments, 35 views; (10) Grand Canyon National Monument, 24 views. Department of the Interior, Washington, D. C., 1917. [“Second edition, brought up to date by the substitution of later photographs and enlarged by the addition of the Hot Springs section.” (Cf. *Geogr. Rev.*, April, 1918, p. 337.)]

ZIEGLER, VICTOR. **Foothills structure in northern Colorado.** 39 pp.; maps, diags. *Colorado School of Mines Quart.*, Vol. 12, 1917, No. 2. Golden, Col.

MEXICO AND CENTRAL AMERICA

GAMIO, MANUEL. *Forjando patria (pro nacionalismo)*. 328 pp.; diags., ills. Porrúa Hermanos, Mexico, 1916. 7½ x 5.

Dr. Gamio's contribution to what is beginning to be known in English-speaking countries as "race appreciation" is of great importance. The whole purpose of the compact book under review is to call the attention of the public to the present-day significance of the native race of America and to its potentialities for modern civilization. Dr. Gamio points out that about three-fourths of the contemporary population of Mexico is Indian in blood, language, culture, and psychology. The same is true in Peru, Bolivia, Ecuador, Colombia, and other countries. This means that in many parts of "Latin" America the population is not predominantly Latin but is chiefly Indian. Since this is so, the modern civilization of those lands, which is essentially a not wholly successful reproduction of European civilization of the Latin type, is anomalous and unnatural. To ensure the wholesome and normal development of any people which has raised itself above the grade of savagery, the social, political, and material factors by which the lives of the people are governed should be in very large measure the products of the people's own experience. Observance of this principle accounts for British success in India and for French success in North Africa. In America, the principle has been ignored ever since the advent of the European in the Western Hemisphere.

In spite of bitterly adverse conditions much undeniable capacity for real contributions to a modern civilization is still latent among the Indians in Mexico and the other countries. These lands, for natural and environmental reasons, can never become predominantly European, either by immigration or by the natural increase of their present European element. If these nations are ever to have the intelligent and happy class of husbandmen which is so necessary in the modern state, if they are ever to make any advance beyond their present status in material and political affairs, it must be done by, through, and for the descendants of their present inhabitants. Consequently, the highest importance attaches to the giving to the numerically preponderant Indian element of opportunities for the attainment of the cultural and intellectual development of which it has shown itself capable and of which it is still capable. With great forcefulness Dr. Gamio urges students of anthropology and sociology to examine the characteristics of the native American race as it exists today so that they may appreciate the many important potentialities of the race which has been so long and so unjustly despised. He is now the head of a branch of the Mexican Ministry of the Interior which has for its object an exhaustive study of the actual status of the indigenes of Mexico along the lines laid down in this book. It is very pleasant to note that a country which has too often been misunderstood in the United States should be the first American country to take up this work of great humanitarian and sociological significance.

PHILIP AINSWORTH MEANS

LEPRINCE, J. A., AND A. J. ORENSTEIN. *Mosquito control in Panama: The eradication of malaria and yellow fever in Cuba and Panama*. Introduction by L. O. Howard. xvii and 335 pp.; maps, diags., ills., index. G. P. Putnam's Sons, New York and London, 1916. \$2.50. 8 x 5½. [Pioneer anti-malarial work was carried out at the beginning of the century by Sir Ronald Ross in the East and by Colonel Gorgas, with Mr. LePrince as his assistant, in Cuba. The experience there gained was the basis of the work in the Canal Zone described in detail in this volume. The situation here was however, much more difficult. "The topography, meteorological conditions, and constant changes due to the construction work, together with the character and constant moving of the population and their dwellings, and social conditions, were peculiarly unfavorable to the control work undertaken" (p. 218). Part II of the volume describes the eradication of yellow fever in Cuba and the Canal Zone.]

LÓPEZ, ELPIDIO. *Estudio sobre "Nortes."* Maps. *Bol. Mensual Observ. Meteorol. y Sismol. Central de Mexico*, 1917, No. 6, pp. 263-271. Tacubaya.

LUMBIER, M. M. *La seismología en Mexico hasta 1917*. 102 pp.; maps, diags., ills., bibliogr. *Inst. Geol. de Mexico Bol. No. 36*. Mexico, 1918.

MORLEY, S. G. *The Guatemala earthquake*. Ills. *Amer. Museum Journ.*, Vol. 18, 1918, No. 3, pp. 201-210. [See also footnote 1, p. 459, *Geogr. Rev.*, Vol. 5, 1918, and article beginning on that page.]

WRIGHT, H. M. *Nicaragua, land of enchanted vistas*. Ills. *Bull. Pan Amer. Union*, Vol. 45, 1917, No. 6, pp. 701-718.

— *Nombre de Dios harbor, north coast of Panama. From a survey by U. S. S. "Hannibal" in 1914*. [1:10,000.] *U. S. Hydrogr. Office Chart No. 2160*. Washington, D. C., April, 1917.

SOUTH AMERICA

GENERAL

SIEVERS, WILHELM. *Süd- und Mittelamerika*. xi and 567 pp.; maps, diagrs., ills., bibliogr., index. (Allgemeine Länderkunde, herausgegeben von Wilhelm Sievers.) Bibliographisches Institut, Leipzig and Vienna, 1914. 10 x 7.

A five-foot shelf would certainly contain all of the really first-class books on South America. On such a shelf and even on a list of the ten best we should have to place Sievers' "Süd- und Mittelamerika."

The second edition, published in 1903, has been the best one-volume reference for over ten years. The present (third) edition is even better. Its statistics are up to date, and some of them are exceedingly difficult to find elsewhere. To any one who knows the book, "Look it up in Sievers" becomes a rule. This rule is emphatically applicable to the section on the West Indies and Central America. The photographs are not merely excellent; they have been chosen with fine judgment as to geographic values. Maps like the hachure sketch of Colombia on p. 407 are a contribution to education as well as to geographical science. Prof. Sievers' descriptions are admirable; as one critic has put it, "Though he writes in German he seems to think in French." Especially praiseworthy are his frequent allusions to the limits of knowledge in a particular field. An especially good example is his description of the eastern mountains of Peru between 4° and 9° S. (p. 360).

If we turn from these considerations to some criticisms it is not for the sake of pointing to minor errors. In the first place one gains absolutely no idea in the whole book of the real nature of the topographic forms. No one could picture South America through any description of its relief in this book. To say that a range falls off steeply on the east is really to tell us nothing translatable into terms of scenery. The vast smooth summit slopes of much of the Central Andes are not described at all. Like the rest of his countrymen who have seen South America he does not recognize the nature or meaning of the topographical forms. Such a thing as an explanation of them is not even hinted at. As to the physiography it is merely empirical and informational. It follows that relations of topographic form to human distribution are not brought out even in their obvious aspects.

The list of references at the end of the volume is so long that one rightly supposes it to be critical and complete within the range of valuable books; but, as in too many German works, there is not sufficient recognition of material in other languages. Moreover, outside the field of German works it is not even critical. To take just a few illustrations. Holdich's "Countries of the King's Award" (1904) is not included; nor Bandelier's "Islands of Titicaca and Koati" (1910); nor Denis's "Brazil" (1911)—one of the best books ever written on any South American country. Yet in the list one finds geographically insignificant or irrelevant papers (in German) on purely geological or archeological subjects. According to the map showing explorers' routes (opposite p. 7) no important exploration of the Chilean desert has occurred since 1895. Some wholly insignificant sporting trips are represented elsewhere, and serious explorations are omitted. The rule followed seems to have been to show only those explorations described in print that have been accompanied by a route map.

THE GUIANAS, VENEZUELA, COLOMBIA

BOLINDER, GUSTAF. *Det tropiska snöfjällets indianer. Från en tvåårig forskningsresa till Sierra Tairona och Sierra Motilon, Sydamerika*. 246 pp.; map, ills. Albert Bonnier, Stockholm, 1916. 9 x 6.

The author traveled in 1914 and 1915 through the northern part of Colombia under the auspices of the Anthropological Society of Stockholm and of the Gothenburg Museum. The purpose of the journey was primarily the study of the aboriginal races that might be encountered. Nevertheless, the work contains a great deal of geographical information of real value.

After landing at Santa Marta, of which too frequently described city a lengthy description is given, the explorer and his party proceeded via Valencia de Jesús to the Ijea Indian country, directly to the south of the Tairona Mountains, or the Sierra Nevada de Santa Marta, as the range is more commonly called. The ethnological descriptions and photographs of this small remnant of the great Arhuaco peoples are of value; a more detailed and more carefully written scientific report on the ethnology of northern Colombia will probably appear later. To the lay reader, not versed in ethnological lore, the descriptions undoubtedly are highly interesting, but to the ethnologist they are unsatisfying, as they are so obviously incomplete.

From San Sebastian the journey led towards the eternal snows of the Sierra Nevada. The geographical observations taken in this region are but scant and leave much to be desired; in fact, the descriptions given and the data collected by Simons (F. A. A. Simons: On the Sierra Nevada of Santa Marta and Its Watershed, *Proc. Royal Geogr. Soc.*, London, 1881, pp. 705-723) on the same route are far more complete. It must be taken into consideration that Simons visited the region with geography as his only object, while Bolinder made this a secondary consideration and principally devoted himself to the ethnological problems.

The explorer returned and installed himself in the historic city—now almost abandoned and partially ruined—of Valle de Upar (Valledupar), originally known as Los Reyes and built upon the ashes of an Indian village destroyed by Alfínger during the early part of the sixteenth century, when this German adventurer terrorized the aboriginal population of the region with his wanton cruelties. Here Mr. Bolinder's party was within a short distance of the mysterious Motilone country. Desirous of obtaining data on this unstudied race, the expedition proceeded southward along the western margin of the Sierra de Perijá via La Paz and San Diego (Diegopata), both settlements of minor importance, to some considerable distance in the National Territory of the Motilones, passing the ruined and destroyed villages of Palmira and El Jobo on its route. From the accounts given, the Colombian Motilones have not the same ferocious disposition as have the Motilones of the eastern slopes of the Sierra de Perijá. In dress, customs, and habitations they appear to have a strong resemblance to the Motilones of Venezuela. The Colombian Motilones, however, hold considerable commercial intercourse with the settlers on the outskirts of the region they call their own, and in consequence a penetration of the lowlands they inhabit is not difficult.

After retracing its steps, the party left Valle de Upar and proceeded northward via the small settlement of Atanquez to the highlands of San José, in the territory of the Coggaba Indians. The Coggaba Indians are also part of the Arhuacan family, as are the Ijeas, the Sanhas, and the Busintanas.

Finally the expedition returned to Valle de Upar and thence went, via Valencia de Jesús to Mompos, where a river steamer carried the party down the Magdalena to Barranquilla.

It is rather irritating to the student of South American geography to find Colombia constantly described as "Columbia." If this be the Swedish way of spelling the word, it appears high time the Swedish geographers made a change. If it is simply a peculiarity of Mr. Bolinder, it is inexcusable.

A clear map, 1:635,000, traced from Sievers' map of the Sierra Nevada, 1888, accompanies the volume and is of value in following the routes of the expedition.

THEODOOR DE BOOY

BEEBE, WILLIAM, G. I. HARTLEY, AND P. G. HOWES. **Tropical wild life in British Guiana.** Introduction by Theodore Roosevelt. Vol. 1. 504 pp.; maps, diagrs., ills., index. N. Y. Zoological Society, New York, 1917. \$3.00. 9½ x 6½. [Under the auspices of the New York Zoological Society Mr. Beebe in 1916 established a Tropical Research Station at the point of confluence of three of the great rivers of British Guiana, the Cuyuni, Mazaruni, and Essequibo. The splendid jungle in which the station is situated is described in characteristic vivid fashion and against its setting are detailed the first year's labors of the research party.]

— **Colombia: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

LIERAS, J. A. **Contribución a la meteorología colombiana.** Diagrs. *Proc. 2nd Pan Amer. Sci. Congr.*, Dec. 27, 1915, to Jan. 8, 1916, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 742-768. Washington, D. C., 1917.

MÁRQUEZ, C. C. **Orígenes etnográficos de Colombia.** *Proc. 2nd Pan Amer. Sci. Congr.*, Dec. 27, 1915, to Jan. 8, 1916, Vol. 1, Section 1: Anthropology, pp. 295-329. Washington, D. C., 1917.

MERCADO, JORGE. **Algo sobre geografía militar.** *Bol. del Ejército*, Vol. 4, 1917, No. 1, pp. 48-58. Havana. [Deals briefly with the subject in general and with its application to Colombia. Reprinted from *Memorial del Estado Mayor del Ejército de Colombia* for Sept. and Oct., 1916.]

MILLER, L. E. **In quest of the cock-of-the-rock: A field naturalist's journey across the Andes from Popayán to San Agustín in search of a rare bird.** Introductory note by Theodore Roosevelt. Map, ills. *Scribner's Mag.*, Vol. 61, 1917, No. 5, pp. 577-598. [An admirable account of the region at the headwaters of the Patia-Cauca

and Magdalena in southern Colombia. There are descriptions of the native villages, customs, vegetation, scenery, and an interesting narrative of the trail. The climax of the story is the account of the discovery of the famous cock-of-the-rock, an extremely rare bird of brilliant scarlet plumage with wings and tail of black. The article is illustrated with a colored plate of the cock-of-the-rock and with a small sketch map and good photographs.]

POGUE, J. E. **The valley of emeralds [Muzo, Colombia].** Map, ill. *Travel*, Vol. 30, 1917-18, No. 1, pp. 12-15 and 46-48.

SPINDEN, H. J. **Travel notes in western Venezuela.** Map, ill. *Amer. Museum Journ.*, Vol. 17, 1917, No. 1, pp. 15-23.

TRIANA, MIGUEL. **Improvements for the mouth of the Magdalena River.** Map. *Proc. 2nd Pan Amer. Sci. Congr.*, Dec. 27, 1915, to Jan. 8, 1916, Vol. 6, Section 5: Engineering, pp. 336-349 (discussion, pp. 344-349). Washington, D. C., 1917. [The Magdalena River is the principal artery of Colombia, but its mouth is obstructed by a rapidly growing bar.]

UGUETO, LUIS. **Primeros pasos de Venezuela en el campo de la meteorología. Algunas consideraciones acerca de la altura media anual del barómetro al nivel del mar en Venezuela y acerca de la oscilación barométrica a diversas alturas.** *Proc. 2nd Pan Amer. Sci. Congr.*, Dec. 27, 1915, to Jan. 8, 1916, Vol. 2, Section 2: Astronomy, Meteorology, and Seismology, pp. 715-722. Washington, D. C., 1917.

— **Venezuela: General descriptive data.** 31 pp.; ill. Pan American Union, Washington, D. C., 1916.

VERRILL, A. H. **My boat trip through the Guiana wilderness.** Ills. *Harper's Mag.*, No. 800, Vol. 134, 1917, pp. 242-254.

LECUNA, VICENTE, edit. **Atlas de Venezuela.** 1:500,000. Dibujado y grabado por Luis Muñoz Tébar con los mejores datos y según los últimos trabajos hechos por el personal del Mapa Físico y Político. Sheets: (1) *Estado Apure*, (2) *Estado Monagas*, (3) *Estado Zulia*. Ministerio de Relaciones Exteriores, Caracas, 1916. [These sheets form part of a series of maps, in course of publication, one each for a state of Venezuela, which constitute the most authoritative representation of the country now available. The groundwork is based on the astronomic positions determined by the army engineers in charge of the topographical survey of the country. How radically these positions alter the configuration of even major features can be seen by comparing the outline of Lake Maracaibo on the present Zulia sheet with the usual configuration on current maps. While the content is as good as the present state of knowledge of the country will allow, the execution, both as regards drafting and engraving, is mediocre. Relief is in brown shading; political coloring is used to differentiate districts.]

EUROPE

GENERAL

GAILLARD, GASTON. **Des conséquences de la guerre au point de vue démographique.** *Bull. et Mémoires Soc. d'Anthropol. de Paris*, Ser. 6, Vol. 7, 1916, No. 3-4, pp. 197-228.

MACFARLANE, C. W. **The economic basis of an enduring peace.** 80 pp.; maps. George W. Jacobs & Co., Philadelphia, 1918. \$1.00. 9½ x 6½.

MARVIN, F. S., edit. **The unity of Western civilization.** 315 pp.; bibliogr. Humphrey Milford, Oxford University Press, London, etc., 1915. \$3.40. 9 x 6. [Essays delivered at a summer school for training social workers. While the essays differ in method and aspect, they agree in thinking that "it is not inopportune to reflect on those common and ineradicable elements in the civilization of the West which tend to form a real commonwealth of nations and will survive even the most shattering of conflicts." The essay of most direct value for geographers is by Professor J. L. Myres: "Unity in Prehistoric Times." To quote from an excellent summary of this essay ("Recent Contributions to Geographical Knowledge, I," *Geogr. Teacher*, No. 48, 1917, pp. 67-68). "With much acute criticism of ancient and modern ideas, Prof. Myres includes a description of life in the various vegetative regions of Europe."]

MASARYK, T. G. **Pangermanism and the zone of small nations.** *The New Europe*, No. 9, Vol. 1, 1916, Dec. 14, pp. 271-277. London.

MEILLET, A. *La situation linguistique en Russie et en Autriche-Hongrie.* *Scientia*, No. 71-73, Vol. 23, 1918, pp. 209-216. Bologna.

NEWBIGIN, M. I. *Some aspects of the industrial revolution in western Europe.* *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 7, pp. 251-263. [Abstracted under "Geographical Record" in this number of the *Review*, p. 450.]

VALBAUX, CAMILLE, AND JEAN BRUNHES. *Les éléments géographiques de la guerre.* *Scientia*, No. 70, Vol. 23, 1918, pp. 111-124. [Germany, the launcher of the war, saw certain regions and points the taking of which would assure a maximum of profit: these are the "aims of war." They are here classed as "tangible realities" and impracticable "dreams" and their geographic elements are discussed. The terrible and increasing inequality of the populations of France and Germany is the first and most important element of the war. German increase first found outlet by emigration, then by industry, now it has taken the form of expansion by war and that expansion has aimed east and west. Eastward the primary object was occupation of the lands from Riga to Galicia known to Pan-Germanists as "lands of agricultural colonization." Westward, besides the iron fields of French Lorraine, Germany aimed at securing a maritime port to the Rhine; for geographical and especially for strategical reasons Antwerp was the selected victim. With the "Road to the East," German ambitions begin to grow chimerical; but it is the sea that has shattered dreams of still greater expansion.]

— *Eastern Europe, The theatre of war in.* 1:1,140,000, or 1 inch to 18 miles. (Stanford's War Maps, No. 11.) Edward Stanford, Ltd., London, June 16, 1915. [Elevations in five grades of altitude tints in brown.]

— *Western front, The, at a glance. A large-scale atlas of the Allies' fighting line in the West, with index.* New enlarged edit. George Philip & Son, Ltd., London, [1917]. 1s. 3d. net. 7 x 4½. [Handy maps. Battle line on July 1, 1916, Aug. 1, 1917, and Dec. 1, 1917, shown on relevant plates.]

GERMANY

GUYOT, YVES. *La Province Rhénane et la Westphalie: Étude économique.* 144 pp.; maps, diagrs., bibliogr. Attinger Frères, Paris, 1915. 6 x 9½.

In this work the reader finds himself guided through a labyrinth of economic problems by a scholar of authority who has dealt with the problem of Rhenish Prussia as it affects Europe industrially. German methods of dumping are exposed in full light, and suggestions regarding their prevention are offered. Many will not approve of the author's radical solution of the problem by the creation of an independent and neutral state consisting of Rhenish Prussia and Westphalia, but all will agree with his views regarding the danger of allowing a single nation to acquire so great a power that it is enabled to establish virtual dictatorship on the commercial and industrial life of its neighbors. The author's conclusions must be taken as suggestions to avoid this condition in Europe rather than deliberately conceived with the intent to raise obstacles to the free development of future German trade and industry.

DE LAUNAY, L. *La valeur économique de l'Alsace-Lorraine.* Maps, diagrs., ills. *La Nature*, No. 2327, 1918, May 4, pp. 273-280. [See note on "The Mineral Resources of Alsace-Lorraine and Their Significance" in the August *Review* (Vol. 6, 1918), p. 175.]

HAUSER, HENRI. *Les méthodes allemandes d'expansion économique.* 7th edit., revised and corrected. xiv and 290 pp. Armand Colin, Paris, 1917. 3 fr. 50. 7½ x 5.

HOLDICH, T. H. *New political boundaries in Europe: Alsace-Lorraine.* *The New Europe*, No. 17, Vol. 2, 1917, Feb. 8, pp. 106-111. London.

SNOW, C. D., AND J. J. KRAL. *German trade and the war: Commercial and industrial conditions in war time and the future outlook.* 236 pp. *Bur. of Foreign and Domestic Commerce Misc. Ser. No. 65.* Dept. of Commerce, Washington, D. C., 1918.

AFRICA

SOUTH AFRICA

BEWS, J. W. *The plant ecology of the Drakensberg Range.* Diagrs., ills. *Annals of the Natal Museum*, Vol. 3, 1917, Pt. 3, pp. 511-565. London.

In the Drakensberg, as in the rest of Natal, grassland (veld) appears the dominant plant formation. Where climatic factors are favorable it is replaced by bushland. Such

factors are maximum precipitation, rapid drainage of cold air, shelter from drying winds. The zone of maximum precipitation, on which no exact meteorological observations have been made, is clearly defined by the belt of bush. Its general elevation appears to be about 5,000 feet or more. The mountain slopes characterized by the phenomenon of temperature inversion favor tree growth, whereas the frosts of the valley floors are distinctly unfavorable. Hot, drying winds of the föhn type coming from the north and north-west are also harmful to trees. The bush is best developed on the southeastern slopes where the gradient is sufficient. Over certain areas characterized by *Protea* veld—a veld with small, isolated trees of *Protea* species—the determining factors are delicately balanced. On the steeper slopes bush passes into scrub, and on very steep and unstable slopes at high elevations appears a transition form of low shrubs of the sclerophyllous type well known from the maquis formation of the Mediterranean and the chaparral of California and the espinal of Chile. In the Drakensberg and in the Cape region of winter rains, where it is extensively developed, it is known by the Dutch term *fynbosch*, a useful distinguishing term that the writer proposes to retain.

Compare the article by Henkel listed below.

HENKEL, J. S. **Forest progress in the Drakensberg.** Diags. *South African Journ. of Sci.*, Vol. 13, 1916-17, No. 5, pp. 179-186. [In the area studied forest appears to be gaining on grassland. Compare the article by Bews listed above.]

PHILLIPS, E. P. **A contribution to the flora of the Leribe Plateau and environs, with a discussion on the relationships of the floras of Basutoland, the Kalahari, and the south-eastern regions.** Maps, diags., indexes. *Annals South African Museum*, Vol. 16, Pt. 1, pp. 1-379. Cape Town, 1917.

SIM, J. M. **The modification of South African rainfall.** *South African Journ. of Sci.*, Vol. 13, 1916-17, No. 7, pp. 318-326. [Largely from changes in the character and distribution of vegetation the author concludes (1) that the rainfall throughout South Africa has decreased in the last hundred years, (2) that the character of the rainfall has entirely changed from soft soaking rains to torrential thunderstorms. The latter point is considered of primary importance and is largely attributed to human interference with the vegetative cover—destruction of forests and ruination of the grass veld by burning, the work of the agricultural Bantus followed by the early Dutch and English settlers.]

WORLD AS A WHOLE AND LARGER PARTS

NAVARRO Y LAMARCA, CARLOS. **Compendio de la historia general de América.** Preface by Eduardo de Hinojosa. Vol. 1: xxxiii and 529 pp.; maps, ills., bibliogr., index. Vol. 2: xi and 886 pp.; maps, ills., bibliogr., index. Angel Estrada y Comp., Buenos Aires, 1910, 1913. 5½ x 8½.

This work is a compendium of American history, including both North and South America. Its style is of course condensed and bare in the extreme on account of the immensity of the ground it has to cover, starting from the earliest Indian antiquities and coming down to the battle of Santiago. It is true that the American Civil War does not figure, nor the Mexican war; but our colonial days and our Revolution are pretty well represented. The latter, however, figures not as the American Revolution but as a part of it! The American Indian figures extensively, our Indians of the north as well as those of the southern continent.

Geographers should be interested in the extraordinary collection of over a thousand maps and pictures, most of them facsimiles of works not easily procured. Probably no greater collection of old American maps and pictures was ever gathered together in a pair of volumes. Among the illustrations are modern maps and some really charming half-tones. The illustrations of the Indians of all the Americas are admirable.

MARK JEFFERSON

BOAS, FRANZ. **Modern population of America.** *Proc. 2nd Pan Amer. Sci. Congr.*, Dec. 27, 1915, to Jan. 8, 1916, Vol. 1, Section 1: Anthropology, pp. 9-15. Washington, D. C., 1917. Also published in *Proc. 19th Internat. Congr. of Americanists Held at Washington, Dec. 27-31, 1915*, pp. 569-575. [Smithsonian Institution], Washington, D. C., 1917.

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GERMAN COLONIZATION IN EASTERN EUROPE*

By JEAN BRUNHES AND CAMILLE VALLAUX

Collège de France

German Policies and Programs

In the East the soldiers of Hindenburg, following the old tracks of the Knights of the Teutonic Order and the Livonian Knights, are taking possession of the territories that the Pan-Germans claim as lands for agricultural colonization. . . . This campaign therefore constitutes a colonial expedition on a large scale and is the fruit of a colonial policy. If space would allow, this thesis could be substantiated more fully. . . .

The present authors thus express themselves in a recent paper on "The Geographic Elements of the War."¹ In the present paper it is intended to develop this theme.

GROWTH OF GERMAN IMPERIALISM

Late converts to the conception of world politics, the Germans found the world divided among the great colonial empires. Bismarck had been an enemy of all colonial policy: the new empire arrived too young and with too great an appetite into a world too old! But the political and economic growth of the German Empire led the government and the whole nation to favor world-wide expansion. On the eve of the war imperialism was making headway even among the radical and socialist parties. In the *Revue Economique Internationale* for July 15-20, 1913, which was at that time published in Brussels, Dr. Gustav Stresemann declared:

We Germans are now familiar with world-economic and world-political considerations; Germany knows that her future depends on her world importance, and it is on this conception that all our policy will be based in the future.

He spoke the truth.

All the reasons based on the birth rate and the increase in population were used to prove the economic necessity of acquiring sufficient territory to furnish the prime necessities of life.

* Editorial translation of the French original, written for the *Geographical Review*.

¹ Les éléments géographiques de la guerre, *Scientia*, Vol. 23, 1918, pp. 111-124. Bologna.

Germany [continued Dr. Stresemann] does not want colonies for the pleasure of planting her flag there; she needs facilities for easily acquiring cotton, iron ore, copper, and rubber. . . . Even the Social Democratic party now ridicules the fear of imperialism; if the passage of an important measure really depended on Socialist votes, the Socialists would not dare oppose the economic and world-political projects of the government, because, in assuming such an attitude, they would be certain to suffer a defeat at the next election.

AN APOSTLE OF PAN-GERMANISM

With all the more reason the Pan-Germans had proclaimed the theory of the necessity for establishing the Germans throughout the world. One of the most characteristic books which appeared before the war was that by Otto Richard Tannenberg entitled "*Gross Deutschland*," published in 1911.² The name Tannenberg is a pseudonym bitterly reminiscent of the battle in which the Knights of the Teutonic Order were annihilated by the Poles on July 15, 1410. Unfortunately, the Germans have already taken revenge upon the Slavs on the fields of this same Tannenberg on August 30, 1914.

Might makes right. All might has inherent right to full development. This is the two-fold idea, juristic and historic, which consciously or unconsciously is at the root of German political philosophy, as revealed in this book. Let us try to disengage from this brilliant but arduous discussion what are the main elements of might which Pan-Germanism can invoke to legitimatize itself. These are:

(1) Political might. Of course, Tannenberg recalls the glories of the Teutonic Knights and the House of Hapsburg, and, also of course, he neglects to discuss the periods of decline of German power. It is assumed, it would seem, that the curve of German political development had always risen, a conception which is obviously contrary to history.

(2) The flood of German emigration, to which the United States bears witness more than any other country.

(3) German colonial expansion, with the right of historic priority conferred upon it by the Hanseatic League.

(4) Linguistic dominance. The principle of a sort of linguistic superiority over Holland and the Scandinavian countries is advanced.

(5) Numbers. The rights of a population which increases like that of Germany are continually invoked both by the economic and political writers of Germany; this argument recurs throughout Tannenberg's book.³ In the relevant passages as well as on the curves of the diagram on page 261 distinction is ingeniously made between the German Empire and the German people—a distinction which makes it possible to combine all the populations of German nationality. This justifies the author in saying: "If we remember that the German people, with its 87,000,000 souls, is

² The present quotations are from the excellent French translation by Professor Millioud of Lausanne, entitled "*Le rêve allemand; la plus grande Allemagne; l'oeuvre du XXème siècle*", Payot, Lausanne, 1916.

³ Pp. 100, 109, 256, 268, 272, 297.



THE FIELD OF GERMAN COLONIZATION IN THE BALTIC PROVINCES AND THE UKRAINE

Scale 1:14 500 000

100 0 100 200 miles

..... Generalized racial boundaries

The boundaries of the Russian provinces containing the compact mass of Little Russians constitute the limit here shown as the boundary of the Ukraine.

→ Route of the Varangians

Cities connected with the Hanseatic League underscored thus

Black earth (chernoziom)

Coal

Iron

double the population of France, that it is only 3,000,000 less than the population of Russia with its three ethnic subdivisions of the Great Russians, the Little Russians, and the White Russians, and only 120,000,000 less than the entire Anglo-Saxon race, which furthermore consists of two branches, one in Europe and one in America, then we shall see less and less reason for our inferior situation."

The German people thus has the right to establish itself anywhere in the world. On this argument is based a voracious colonial policy whose principles vary according to the author but of which Tannenberg is a typical exponent; but the matter of prime importance is to round out Germany proper by annexing Holland, Belgium, Luxemburg, Switzerland, the greater part of Austria, the Russian Baltic Provinces, Lithuania, etc. This is the initial program. It is summarized in the last two lines of the book, which we quote: "Greater Germany, with an area of 1,148,666 square kilometers, is the aim of the German people of the twentieth century." These are the closing words of a quasi-official book—words it would have been well to ponder over.

GERMAN THEORY OF COLONIZATION

It is necessary to pick out certain of these publications and to call attention to the state of mind which they express in order to realize the absolute covetousness of that theory of colonization of which the Treaty of Brest-Litovsk was the fulfilment. Colonization, colonization of nearby lands, especially the lands of the east between the Baltic and the Black Sea, such is the program, such is the justification of the principle.

We Germans of today, we do not enter a country to plunder it; we enter it to take possession of it forever. We divide the land among the peasants because we know by experience that a free peasant state furnishes the largest number of soldiers and the largest amount of revenue. The land will be divided as follows: 30 per cent to be left in a state of nature, that is in forests; 5 per cent to be freehold lands for the cities and villages; 10 per cent to constitute landed estates; and 55 per cent to go to the peasants.

The countries under consideration in this publication of 1911, let us note, were the Baltic Provinces and the Ukraine.

We have made clear, we trust, the German conception of the term "colonial policy." We must now enter deeper into the facts and demonstrate that the attitude of Germany towards the regions to the east corresponds to two types of colonization, which in turn correspond to two types of regions: the policy of hegemony, or domination through social control, in the Baltic Provinces and the policy of economic exploitation in the Ukraine.

Colonization through Social Control: The Baltic Provinces

The history of German colonization in the Baltic Provinces for eight centuries proves that Teutonic activity has never been seriously impeded there. It commenced in the Middle Ages, in the golden age of feudal Germany,

and it is linked by a continuous bond with the German renaissance of the nineteenth century. The Germans have had their own way in the Baltic Provinces. They have there put into effect in all its severity and rapaciousness *hegemonic colonization*, or colonization through social control, as they understand it; although numerically inferior they have become the *Herrenvolk*, an expression which we sometimes inadequately translate by "the master people." It really means "the race of masters," a different concept, having a significance of its own.

The history of these lands of servitude demonstrates what would be the fate of all of eastern Europe if the Germans were left free to exploit the political disintegration of the Slavs. It also shows the West what its fate would be had German power not been crushed.

CHARACTER OF THE BALTIC PROVINCES

The Baltic Provinces consist of Esthonia, Livonia, and Courland. Esthonia faces the Gulf of Finland; Livonia and Courland face the Baltic and are deeply indented by the large Gulf of Riga, which is half closed by the islands of Dagö and Ösel. Although a part of the Russian Empire, having been conquered two centuries ago by Peter the Great, the Baltic Provinces, because of their surface configuration, were not, properly speaking, Russian lands. While as flat and monotonous as Muscovy⁴ or the steppes of the Ukraine, they nevertheless bear the impress of another age in the earth's history. The glaciers of Scandinavia and Finland have left their mark on these provinces. They are dotted with numerous lakes and even more numerous swamps. They are strewn with erratic boulders and glacial ridges of earth or sand (*âsar*).

These are not promised lands, but lands requiring hard work, work rendered harder still by an almost subarctic climate (latitude 56° to 59°). They are covered with great coniferous forests; even today, in spite of the areas cleared, forests occupy nearly a third of the total area of the Baltic Provinces, or one quarter of Esthonia, two-fifths of Livonia, and one-fifth of Courland. Add to this the swamps, the lakes, and the rocky tracts, and it will become apparent how little land remains for the cultivation of rye, oats, flax, and potatoes—almost the only crops the soil can produce.

DENSITY AND RACIAL COMPOSITION OF THE POPULATION

These 100,000 square kilometers of inhospitable northern lands contained a population of barely 3,000,000 in 1913, or about 30 to the square kilometer. This is a sparse and scattered population in comparison with our Western rates, but it is normal and average for the density of the adjoining regions, Scandinavia, Muscovy, and Finland. Ten centuries before, at the beginning of the Teutonic enterprise, the forests were more extended and the human groups more scattered. But the body of the population was, ten centuries ago, practically the same as today, with one exception—one racial

⁴ Used throughout the paper in the sense of the heart of Russia, centering about Moscow.—EDIT. NOTE.

group, the Livonians, has practically disappeared. The other groups continue in greater density but within the identical geographical area. These are, in Esthonia, the Esthonians, who are related to the Finns, and, in Livonia and Courland, the Letts, who are related to the Lithuanians. The Esthonians and the Letts constitute the human material which has been manipulated and exploited since the twelfth century by the German ecclesiastical, feudal, and commercial aristocracy.

But prior to the coming of the German conquerors, other conquerors of Teutonic blood also trod the Baltic lands—the Scandinavians.

THE SCANDINAVIAN INCURSION: THE VARANGIANS

The historic fate of these lands of northeastern Europe, these insecure border provinces of Slavdom, may be summarized in one phrase: they were never free, but always subject, in varying degree, to some other power. Before becoming lands of agricultural and commercial colonization, they were lands of transit and of penetration. Up their deep gulfs came to the Slav lands the Varangians of Scandinavia, called into the country in the ninth century by the Slavs themselves, who despaired of overcoming with their own strength their incurable inaptitude for self-government. The Chudes, a Slav tribe from the region of Novgorod, expressed with singular clearness the present and future destiny of the Slav peoples when, as reported by the chronicler Nestor, they appealed to the Varangians in these terms: "Our country is large, and there is much of everything in it. But there is no order and justice. Come and take it and govern us." It is not difficult to imagine the Ukrainian *hetman* Skoropadski appealing in similar terms to General von Mackensen.

The route of the Scandinavian Varangians did not cross the Baltic Provinces. It went around them on the north and east. It followed the Gulf of Finland, the Neva River, the Volkhov River, and Lake Ilmen to reach the Volga and the Dnieper. It thus cut the Esthonians and the Letts off from the mass of Slavs; it made Slav expansion to the shores of the Baltic more difficult; it possibly prevented the conversion of Esthonia, Livonia, and Courland to Byzantine Christianity; it certainly facilitated the German colonization which came a little later. The Scandinavians prepared the way for the Germans.

THE GERMAN CONQUEST

But how much slower, more methodical, more patient, and more complete was the German conquest in the Baltic lands than the hasty passage of the Varangians across the Russian lands! The Varangians were soon engulfed in the Muscovite ocean: they bequeathed to future Russia only her name (*Rus*, *Ros* is the Finnish form of *Varangian*) as well as the common law of the *russekaya pravda*. On the contrary, the Germans, become masters in the thirteenth century in Esthonia, Livonia, and Courland, have remained imperious and absolute masters. For seven hundred years they have dominated and exploited the native population without ever merging with them.

The Germans came to the Baltic Provinces as merchants and as proselytizers. As merchants they acquired control of the cities, of commerce, and of the highways; they built the foundations of an urban society. As proselytizers they laid feudal hold of the strategic points and subsequently more and more of the greater part of the land. They created a class of nobles and of large landowners.

THE MERCHANTS

The merchants came first. The chronicles tell of shipwrecked mariners who appeared as supplicants in 1159 at the mouth of the Dvina. The natives, showing pity for them, gave them shelter and sustenance. These shipwrecked men were from Lübeck; they came back in larger numbers and settled in the Dvina region. Soon they had established regular communication between Lübeck, the Gulf of Riga, and the valley of the Dvina, the natural highroad into the Russian lands. The establishment of the way station of Wisby on the island of Gotland facilitated their enterprise to a marked degree. This island, with its strategic position facing the coasts of Estonia, Livonia, and Courland, is a true island of domination in Ratzel's sense, a nucleus whence ruling power radiates afar over wide areas. Wisby recalls the islands of Tyre, of Ternate and Tidore. It has had as prosperous a fortune—in the fourteenth century it was one of the chief ports of the Hanseatic League—although less well known than these.

THE TEUTONIC AND LIVONIAN KNIGHTS

Monks and the bishops followed closely on the German merchants. The monks and bishops in their turn gave way to feudal lords. These Baltic lands were still three-quarters pagan at the end of the twelfth century. They were therefore lands for crusading. The sword and the cross labored there in close union, as in Palestine. What the Knights Templars and the Knights of St. John wanted to do in Jerusalem the Knights of the Teutonic Order did in Prussia and the Livonian (Sword-Bearer) Knights did in Estonia, Livonia, and Courland.

Üxküll had been founded in 1187 by Bishop Meinhard; Riga was founded in 1198 by Bishop Albert, the same Albert who in 1200 instituted the Order of Livonian Knights. Teutonism progressed up the valley of the Dvina and by the thirteenth century had flooded the greater part of the three provinces. This event is contemporaneous with the conquest of Prussia by the Teutonic Order, and it is an analogous event. Nevertheless, there is a very great difference. In Prussia the Knights of the Teutonic Order exterminated the natives nearly to the last man; in the Baltic Provinces the Livonian Knights could not or did not wish to do as much, although their order had been united with the Teutonic Order since 1237. The native population survived, but it was subjugated. In spite of the changing forms of civilization the region is still today a subject country, and that even more than ever.

MODERN GERMAN DOMINANCE

The Teutonic domination is revealed on the map by the German names of the strategical centers and the main highways. In the structure of society it is evident from the concentration of wealth both in land and in personal property in the hands of the Germans. German merchants control the trade of the cities as at the time of the Hanseatic League. The German-Baltic barons control the lands which the expropriations and the massacres carried out by the Livonian Knights placed at the disposal of their ancestors.

The Germans constitute not more than 6 to 7 per cent of the population of the Baltic Provinces, but they are concentrated in all the important places and they hold in their hands all the wealth of the country. The districts that are most completely Germanized are the shores of the Gulf of Riga and the valley of the Dvina, that is to say the historic route followed by the Hanseatic merchants to the black-earth lands. The coast and the rivers are bordered with towns and villages of German aspect. The older parts of Riga recall the glimpses of a Hanseatic Venice which are still to be had in the heart of Hamburg or of Danzig. "Riga, a large and beautiful city," says Bakluchin in his "Memories of the House of the Dead." "It has only one fault—too many Germans!"

The German burghers of Riga and Mitau call the peasants of the neighborhood "Easterners" in contempt. The controlling class in the cities, made up of merchants and influential citizens, is almost entirely German. When an Esthonian rose to the rank of citizen he became a German by this very fact. He was no longer a member of the despised race; he became a full-fledged German.

LAND TENURE

In the country districts the hardest kind of serfdom has for seven centuries weighed heavily on the expropriated and exploited natives. In Livonia 67 per cent of the lands belongs to the nobles and 15 per cent to the state. The estates of 823 landed proprietors have an average area of 3,800 hectares. Thus every Livonian landed proprietor in general owns a piece of territory which is as large as three rural communes in France. These domains are divided into large estates (*Rittergüter*) about which live in misery the field workers and the peasants (*Knechte*), who can be dismissed at the owner's will.

The severity of the German seigniorial right has left a terrible memory among the inhabitants of Livonia and Courland. Cutting off a leg was a customary punishment for the serf who fled from the master's house. Esthonian mothers still frighten their disobedient children by telling them "The German is coming!" (*Saks tuleb*) much as we frighten ours with wolf and ogre. A Lettish song quoted by Reclus expresses in brief the misery of the country districts. "The forests are full of wolves and bears; the fields are full of masters!"

During the period of Swedish domination some humane and just measures were put into force which rendered servitude less hard. But the Russian conquest gave back to the German-Baltic barons the full and complete exercise of their ancient feudal rights. The abolition of serfdom from 1816 to 1819 was for the unfortunate Baltic populations only an illusory reform, inasmuch as the power and the lands remained in the hands of the landed proprietors and the local laws and taxes were not changed.

PRESENT GERMAN COLONIZATION PLANS

Thus in the Baltic lands, in spite of the absence of any German political control since the decline of the Hanseatic League and the religious orders, the feudal and commercial domination of the Germany of the Middle Ages has, without any change of importance, been continued and perpetuated to our day. What will happen now? To their social domination the Germans have again added political domination. What will they make of it?

They are already acting, without losing a moment, in a way to insure their authority against any possible infringement or decline. They are the *Herrenvolk*, the race of masters: they not only wish to remain so, but they wish to become so still more.

They have realized that the vulnerable point in their control of the Baltic lands is the small number of Germans who live there. Masters of the land and its wealth, they are nevertheless not strong enough numerically to overcome possible national and social uprisings. A social structure consisting solely of landed proprietors and merchants is an unstable structure. In order to consolidate it there is need of a rural middle class. The system of *Rittergüter* must be completed and even replaced by a system of peasant (*bönder*) farms. The Germans are already preparing a scheme of colonization for the German settlers who are to complete the occupation of Livonia, Esthonia, and Courland to the advantage of imperial Germany; they do not hesitate to think of expropriating the German-Baltic barons themselves and, of course, still less the native population, for the benefit of the German peasants.

Under date of July 2, 1918, a newspaper despatch from Basel gives an abstract of the proclamation which Marshal Hindenburg had just made with regard to the colonization of Courland; similar measures will doubtless be applied to the other two provinces. A German colonization society known as the "Society of the Lands of Courland" is to have the right to intervene as purchaser in all transactions relating to rural property to the end of 1948. It will enjoy preferential rights in all forced sales; it will advance only 85 per cent in cash for the purchases and the remaining 15 per cent will be charged to the seller as a contribution to the fund of the Society! In order to indemnify the German-Baltic barons, their estates will be bought at their pre-war value in 1914. "Thus," says the *Frankfurter Zeitung*, "there will be a practical possibility of commencing

a work of colonization on a large scale. The settlers are already at the gates."

Thus, we should say, does the latest stage of German occupation of the Baltic Provinces present itself. By disguised confiscation Germany wishes to change them into German lands. It is the same method which has been followed in Prussian Poland; it is the same method which the Germans wish to follow in Alsace-Lorraine; and in the Baltic Provinces the same method has been approved in advance by the Bolsheviki of Brest-Litovsk, who were neither simpletons nor fools but conscious accomplices.

Economic Colonization: The Ukraine

POLISH RESISTANCE TO GERMAN DOMINATION

Along the eastern boundary of Germany, between the Baltic Provinces and the Ukraine, lie Lithuania and Poland. In these countries a glorious political past, an exceptional intellectual development, a population which is the densest and most industrialized of Eastern Europe, a complex of national aspirations which in spite of the division and the conflict between Lithuanians and Poles can no longer be disrupted—all these create so complicated and so serious a situation for the German Empire that there can be no thought of colonization as such in this region. The problems are of a different nature, and it is for this reason that we will not examine them in the present paper.

Evidently, if she had been victorious, Germany would have attempted to introduce in Lithuania and Poland the same faithless and brutal methods of colonization by which she tried to Prussianize the Grand Duchy of Posen. But while the famous Prussian expropriation law finally obtained only mediocre results, the Poles on their part, under the lash of scientific German persecution, girded their loins and organized for a national resistance on an economic basis. One should read in Henri Moysset's "*L'ésprit public en Allemagne: Vingt ans après Bismarck*" (Paris, 1911), one of the most notable books published in France before the war, the first two chapters, entitled "The Germanization of the Eastern Marches; Colonizing Laws" and the "Expropriation of the Poles," in order to realize the force that was used against them and the force that they on their part opposed to the colonizing power. By a combined financial and agrarian system the Poles have found the means in a measure to oppose the colonization through social control which we have described with regard to the Baltic Provinces or the economic type of colonization which Germany would have to apply in the case of the Ukraine.

If the Treaty of Brest-Litovsk is not revoked, the Ukraine will be a new domain for the territorial appetites of the Germans. The treaty delivered this immense territory to them as a gratuitous gift, as it were. To be sure, they had studied all the separatist possibilities within the Russian body politic and in this respect had reserved a place apart for the Ukrainians—

the book by Inorodetz on the alien races of Russia bears evidence to this effect—but the most covetous among them could not suppose that the prey would fall so soon into their hands! This unexpected development brought the Ukraine within their range as a veritable colony of exploitation.

DISTINCTIVENESS OF THE UKRAINE: THE LITTLE RUSSIANS

The Ukraine is not an artificial creation. The Ukrainians are the Little Russians, who are in contrast to the Great Russians and the White Russians. They consider themselves as alone having the right to bear the name of Russian. They have called themselves Ukrainians since the time when the Muscovites with their Tatar infusion usurped this designation. The Little Russians of Russia are the same as the Ruthenians of Galicia and the Bukovina. "Ruthenian" is derived from the Greek word *Ῥuthήνοι*, which, in modern Greek, is pronounced almost like *Rusínoi*. The great majority of Ruthenians are Greek Catholics, or Uniates; the Little Russians are Greek Orthodox, but throughout their history their conflicts for independence from Muscovy have always been in the domain of religious hierarchy. National and religious conflicts before the war in Austria and in Russia thus revealed the possibilities of resistance and of independence on the part of the Ukraine.

At the University of Lwów (Polish form; Leopold in Little Russian; Lemberg in German) no semester passed without an often violent manifestation by the Ruthenian students, who were in the great majority, of their national animosity against the Polish and Austrian professors.

In Russia the Little Russian national movement had, in the last twenty-five years, taken on a nihilistic or revolutionary character. The sanguinary outbreaks in Poltava and Kharkov in 1901 and 1902, in Kiev and Odessa in 1904 and 1905, and in Kiev and Kharkov in 1906, were all due to the Ukrainian revolutionary party. Shortly before the outbreak of the war, in February, 1914, a popular demonstration had taken place in Kiev involving about 200,000 persons whose slogan was "Long live the Ukraine! Down with Russia!"

It is thus wrong to say and to think, as have so many Russian officials of the old government of the Czar and so many poorly informed diplomats of the Entente, that the Ukrainian movement was only artificially created for the purpose of the moment and that it originated in Brest-Litovsk solely to serve the interests of Germany. Without entering into the detail of the history of the Ukraine it is worth noting that in 1349 the states called the Grand Duchy of Kiev and the Kingdom of Galicia-Ludomera had united with Poland and that in 1648 they revolted and made war against her. After six years of fighting and turmoil the Ukrainians turned toward Muscovy and at Pereyaslav in 1654 concluded a treaty of union. This treaty was respected for ten years. Empress Catherine II, by a ukase in 1764, arbitrarily broke this treaty of alliance. The Ukrainian government was suppressed, and in 1775 the Zaporogian army, which was the Ukrainian

army, was disbanded. It is from that time that dates the unquenchable hate and the latent revolt of the Little Russians against the Great Russians.

EXTENT OF THE UKRAINE

What exactly is the Ukraine, and what are its limits? It is very difficult to determine. Not only are the Ukrainians much mixed with the adjoining peoples, as, for instance, in the district of Cholm which the treaty of Brest-Litovsk has accorded them although the majority of the population is Polish, but even in the Ukraine proper the Ukrainian race and the Little Russian mentality and language have maintained themselves pure only in the country districts among the peasants. Throughout the world the large cities have more and more become cosmopolitan centers, racially heterogeneous. This is also the case in the Ukraine. Kiev, its most important city, is one of the oldest cities of Russia, a center of monastic life and religious pilgrimage, a holy spot for all Russians, and likewise an industrial city. Hence its population is very mixed. The metropolis of the Ukraine has thus less than any other Ukrainian city a Ukrainian soul, so to speak. The conflict of the *radas* of Kharkov and Poltava, two cities which have remained more Ukrainian, with the *rada* of Kiev is a phase of this political protest against the general phenomenon of what might be deemed the denationalization of capitals.

If we accept the statements of the leaders of the Ukrainian movement we must count as belonging to the Russian part of the Ukraine the Russian provinces of Volhynia, Podolia (with the district of Cholm), Kiev, Kherson, Poltava, Chernigov, Kharkov, Yekaterinoslav, Taurida (with the Crimea), and the Kuban district. According to their conception a certain number of districts adjacent to Bessarabia, Poland, and on the Don should also be added.

POPULATION OF THE UKRAINE

The Russian and the Austrian parts of the Ukraine comprise together 850,000 square kilometers, with a population of 35,000,000 people, of whom 30,000,000 are in the Russian part.

The following table shows the Ukrainian population, and its percentage of the total population, in the different districts of Austria-Hungary and Russia inhabited by Ukrainians according to the data of the Russian census of 1897 and the Austrian-Hungarian census of 1910.

UKRAINIAN POPULATION OF AUSTRIA-HUNGARY AND RUSSIA

(According to Austro-Hungarian census of 1910 and Russian census of 1897)

AUSTRIA-HUNGARY

ADMISTRATIVE DIVISIONS	UKRAINIAN POPULATION	PER-CENTAGE	REMARKS
Northeastern Hungary.... (south of the Carpathians)	470,000	..	Counties of Máramaros and Bereg, 46%; Ugocsa, 39%; Ung, 36%.
Bukovina.....	300,000	38	Districts of Sastawna, 80%; Kitzman, 87%; Czernowicz, 55%.
Galicja	3,210,000	40	The mean percentage is 59% in the part inhabited by the Little Russians, increasing to 90% and going below 50% only in Lemberg and Yaroslav.
Total.....	3,980,000		

RUSSIA

GOVERNMENTS	UKRAINIAN POPULATION	PER- CENTAGE	REMARKS
Lublin.....	250,000	17	Districts of Grubieszow, 66%; Tomaszow, 52%.
Siedlce.....	140,000	14	Districts of Wlodawa, 64%; Bila, 48%. Mixture of Poles and Jews.
Grodno.....	440,000	23	Districts of Brest, 81%; Kobryn, 83%; Bilsk, 42%.
Minsk.....	390,000	14	The Ukrainians inhabit the district of Pinsk.
Volhynia.....	2,700,000	70	Jews, 13%; Poles, 6%; Russians, 3%.
Kiev.....	3,620,000	79	Jews, 12%; Russians, 6%.
Podolia.....	3,030,000	81	Jews, 12%; Russians, 3%.
Kherson.....	1,640,000	54	Alexandria, 88%; Slivsavet, 73%; Odessa, 47%; Tiraspol, 38%. In the city of Odessa itself there are hardly 10% of Ukrainians, and many Jews.
Bessarabia.....	460,000	20	The majority is Rumanian; the Ukrainians are in the majority only at Khotyn (56%).
Kursk.....	670,000	22	The Ukrainians inhabit only the south, where they reach 55% and 61% in certain districts.
Voronezh.....	1,210,000	36	Same remark—the majority is Russian.
Don.....	280,000	28	Taganrog, 69%; Rostov, 52%. Many Russians or Great Russians.
Kuban.....	1,250,000	47	Russians, 44%; natives of the Caucasus, 9%.
Stavropol.....	450,000	37	Ukrainians in the west and south. The rest, Russians or Nogai.
Terek.....	50,000	5	At Piatigor exceptionally 14%.
Black Sea.....	10,000	16	Tuapse, 27%.
Taurida.....	790,000	42	Dnieprovsk, 76%; Berdiansk, 64%; Melitopol, 57%. The rest are Russians, Tatars, Germans. Alone the north of the Crimea is Ukrainian.
Yekaterinoslav.....	2,110,000	69	Russians, 17%; Jews, 5%; Germans, 5%. The cities, except Alexandrovsk, contain the largest percentages of non-Ukrainians.
Kharkov.....	2,275,000	70	The Russians (28%) form some important islands, but in all the cities the Ukrainians are in the majority.
Poltava.....	3,410,000	95	Jews, 4%.
Chernigov.....	2,450,000	86	White Russians, 5%, especially in the north.
Total.....	27,625,000		

This table can not give other than approximate values, nor is it amenable to any precise critique. The necessity for caution in accepting the figures of the 1897 census of the Russian Empire, published in Russian and in French in 1905, is known; nevertheless it is the only general source to which we can turn.⁵

According to this table the total number of Ukrainians in Austria-Hungary and Russia is 31,600,000. By adding some groups outside the governments mentioned and the emigrants to the United States, we arrive at the figure of 34,000,000 for the total Ukrainian population in the world.

In a general way one can say that the Ukrainians represent 75 per cent of the population of 45,000,000 who occupy the regions grouped together under the name of the Ukraine.

CONDITIONS FAVORABLE AND UNFAVORABLE TO GERMAN EXPLOITATION

The mean population density of the Ukraine is 53 to the square kilometer, which is much less than the density of Poland and much more than the mean density of European Russia, which is only 25 per square kilometer. This reveals one of the most favorable conditions for the realization of the present projects for German colonization in the Ukraine. Another favorable condition is the especially slight population density in relation to the

⁵ See especially D. Aïtoff: *Peuples et langues de la Russie*, *Annales de Géogr.*, Vol. 15, 1906, pp. 9-25, with map, 1: 12,500,000.

food resources of the region. On the other hand this population is still dense enough to furnish a sufficient labor supply. In the third place it is sufficiently developed from the standpoint of intelligence and sufficiently accustomed to agricultural work to be amenable under competent direction to better and more intensive methods of agriculture. It is these facts which lead the advocates of Pan-Germanism and the exploitation of Russia to consider the Ukraine as a promising country and to foresee the economic wealth which it may produce for Germany.

But we must not ignore the other side of the matter. The Ukrainians are indeed Eastern Slavs and as such have only a vague notion of what we Westerners call a sense of nationality—the political events of the last months bear witness to this fact. However, they are a people that is attached to the soil; they constitute a social element which will be restive under any form of direct or indirect expropriation; the wheat which they have sowed and reaped they would rather destroy or burn than deliver to new masters. The peoples of the Central Empires have suffered the greatest disillusionment in realizing that the forcible requisitions in the Ukraine have in 1918 only furnished a small amount of foodstuffs for exportation.

A Greek medical officer who had served in the French army in Rumania and who had recently returned from Russia by way of the Ukraine related the following significant episode. On one occasion he was out in a country district in the neighborhood of Kiev, accompanied by a Russian officer, none other than Prince Kropotkin. Admiring a heap of wheat at a peasant's house, the Greek officer stepped up and, with a movement commonly used in Western Europe, took up a handful of wheat to examine it more closely. The Russian made him drop it immediately, because he was afraid that the peasant might do him harm. To touch grain is a sacrilege in the eyes of the Ukrainian peasants.

Before the Germans can transform this peasant mentality to their purposes, let us hope that many years will pass and many other events have happened.

In the meantime the fact is there. To Teutonic exploitation the Ukraine offers exceptional riches. The following are its chief economic resources.

ECONOMIC RESOURCES

Cereals. The Ukraine includes the greater part of the celebrated black-earth soils (*chernoziom*), whose importance it is not necessary to stress. Forty per cent of the cereal production of Russia comes from the Ukraine. Before the war the Ukraine exported 27-30 per cent of its wheat crop. The extent of the cultivable area amounts to 45,000,000 hectares, or 32 per cent of the similar area for the whole of Russia (whose area is six times that of the Ukraine), and 53 per cent of the total area of the country, a proportion which is only exceeded by France, with 56 per cent. The mean annual production at the beginning of the twentieth century was 150,000,000

quintals of bread cereals (in 1910, 215,000,000), or six times the production of the rest of European Russia and 30 per cent of the production of the Russian Empire. In this mean total wheat accounted for 68,000,000 quintals, rye 42,000,000, and barley the remainder.

Potatoes and Beets. The production of potatoes in 1910 was 38,700,000 quintals in Galicia and 63,200,000 in the Russian part of the Ukraine. The latter produced more than 50,000,000 quintals of beets, which represents at least 80 per cent of the annual production for Russia.

Cattle. Although cattle breeding is carried on extensively, it is not what it could become with better methods. The number of cattle is very considerable, but the quality is not equal to the quantity. A large number of the animals are small in size and of mixed breed; it is estimated that the Ukraine counts 30,000,000 head of large cattle, or at least one-third of the total for Russia.

Coal. The Ukraine includes the celebrated Donetz coal fields, which are among the richest in Europe. They cover an area of 23,000 square kilometers; their production in 1911 amounted to 203,000,000 quintals, or 70 per cent of the total for the Russian Empire. They include much anthracite (31,000,000 quintals in 1911, or 98.5 per cent of the total production for Russia). In Russia the Donetz coal is almost the only coal which lends itself to the production of coke, whence its great importance in metallurgy. (In 1911, 38,700,000 quintals were produced in the Ukraine, as compared with 13,600,000 quintals in the rest of Russia.)

Minerals and Metals. Iron constitutes one of the great mineral resources of the Ukraine; it occurs in different places, but particularly in the neighborhood of Krivoi Rog in the government of Kherson. The production of manganese in eastern Podolia and at Nikopol on the lower Dnieper in 1907 amounted to 3,245,000 quintals, or 32 per cent of the total production of Russia. The copper ore of Kherson and Taurida and of the Bukovina represents 31 per cent of the total Russian production. Mercury deposits are found in the Donetz region, and there are no others anywhere in the Russian Empire.⁶

⁶ Present economic data on Russia are, and cannot be other than, approximate. For this reason attention should be called to the valuable material in *Russia*, a journal published since 1916 in two editions, British and American, by R. Martens & Co., London and New York. The British edition bears the subtitle "Britain's Great Opportunity"; the American, "A Journal of Russian and American Foreign Trade." In Vol. 1, No. 2, and Vol. 2, No. 4 (Brit. edit.) is to be found precise information on the important movement of co-operative associations in Russia. The journal also contains many maps and diagrams, for instance, the general diagram of productivity according to regions, Vol. 2, No. 3; in this connection it is well to remember that the Ukraine, as today defined politically, tends to include the Don province; when this is borne in mind the data presented in the journal will be seen to coincide with those given here. See especially the general map of the mineral resources of the Caucasus, Vol. 1, No. 4, p. 17 (Amer. edit., Vol. 2, No. 9, pp. 16-17), and the Urals, Vol. 1, No. 6, p. 18 (Amer. edit., Vol. 3, No. 1, pp. 16-17), and of gold in the Russian Empire, Vol. 1, No. 5, pp. 17 and 27-32; an article on cotton, Vol. 1, No. 6, pp. 5-12; also the map of the Donetz coal field, Vol. 1, No. 1, p. 18, Vol. 1, No. 3, p. 15 (also Amer. edit., Vol. 2, No. 8, pp. 16-17), and the coal production figures for Russia during the first half of 1917, Vol. 2, No. 2, p. 28; the map of the iron mines of Krivoi Rog (see the text above), Vol. 1, No. 3, p. 22 (Amer. edit., Vol. 2, No. 7, p. 21). The diagram illustrating the article on production of coal in Russia according to districts from 1864 to 1913 (Vol. 1, No. 1, p. 29; Amer. edit., Vol. 2, No. 8, p. 32) indicates the predominance of the deposits included within the Ukraine, in accordance with the statement above in the text.

Salt. All of the salt of the Russian Empire proper is furnished by the rock salt of the Ukraine and the salt works of the Black Sea.

CONCLUSION

The world peace which will end the world war must therefore protect the Ukrainians from "colonial exploitation" by Germany. Germany will be supreme mistress from the Gulf of Finland to the Black Sea. She wishes to realize the dream which for a certain period in history was that of Poland. It is thus that she sometimes ignores historical facts in order to shape them to her purposes and sometimes assumes the rôle of certain powers of the past in order to claim their heritage.

In the desires of the Pan-Germans there is something of geography; there is also something of history. What makes them so formidable is precisely that their activities are based on sequences: sequences in time and sequences in space, sequences of generations and of men as well as things. It is only because of the ignorance and the thoughtlessness of Western Europeans that the appetite for conquest of the Germans has appeared to develop suddenly. Re-read the warnings which the far-seeing Edgar Quinet addressed to France in 1830; at that time Pan-Germanism was called Teutomania and Gallophagy. The words have changed, the things are the same. There are no historical facts more systematically recurring than the appetites and conquests of Teutonism; there are none which, at least in appearance, fit the natural setting better. German sophistry has known how to enlist history and geography in the service of conquering Germany; Treitschke and Ratzel, no less than Karl Marx, prepared the way for Hindenburg.

How could the Germans have been otherwise, inasmuch as the facts and the circumstances themselves seemed to conspire with their ambition? Where time and man had left elbow room to the German he had realized his program of hegemony even before the first cannon shot of the great war. To all thoughtful Germans 1914 was not a beginning, but a culmination.

THE WESTERN MARACAIBO LOWLAND, VENEZUELA*

By THEODOOR DE BOOY

[With separate map, Pl. XVII, facing p. 496.]

LAKE MARACAIBO

Lake Maracaibo was discovered by Alonzo de Ojeda in 1499. At the time of its discovery the lake was called "Coquibacoa" by the aborigines and "Gulf of Venice" by Ojeda, the latter name being suggested to this *conquistador* from the resemblance of the Indian pile dwellings on its shores and in the lake itself to the type of houses erected in Venice on the lagoons. According to Sanchez, Lake Maracaibo was also named the "Lago de Nuestra Señora."¹ Subsequently, both the lake and the principal town on its shores were designated by the aboriginal name Maracaibo, whose origin is obscure. Sanchez states that the name is derived from the exclamation of an Indian warrior who called out "*Mara cayó*" ("Mara falls") on seeing his chief, named Mara, fall in a battle against the Spanish invaders.² This seems far-fetched, as it is hardly likely that the Indian would have been sufficiently familiar with the language of the hated invaders to have made such a remark in Spanish. Crevaux suggests that Maracaibo is possibly derived from the Indian word *maracai*, which means tiger.³ According to Ernst, the word is derived from the Indian word *maracayar-mbo*, which signifies "tiger's foot."⁴

Lake Maracaibo extends from about lat. 9° to lat. 11° N. and from long. 71° to long. 72° W. It is about 100 miles long, north and south, and from 40 to 60 miles wide and is connected with the Gulf of Venezuela by a strait of fresh to brackish water about 35 miles long and from 4 to 10 miles wide. "The depth of water in the south is as much as 250 meters; in the middle about 150 and in the north a great deal less."⁵

The western borders of the lake remained unexplored until 1529 when the German Ambrosio Alfinger crossed from Coro to the present site of the city of Maracaibo and founded a settlement in this place, previous to his transmontane journey to Colombia. There are one or two instances after this where some of the *conquistadores* attempted journeys due west

* This is the second of two articles dealing with the author's expedition to the Sierra de Perijá, Venezuela, in May-July, 1918, under the auspices of the American Geographical Society. The first article, in the November *Review*, discussed the range itself, while the present article takes up the lowland lying between Lake Maracaibo and the Sierra de Perijá. The map accompanying this number illustrates both articles.—EDIT. NOTE.

¹ Silvestre Sanchez: *Geografía y breve historia de la Sección Zulia*, Caracas, 1883, p. 42.

² Sanchez, *op. cit.*, p. 84.

³ Jules Crevaux: *Voyages dans l'Amérique du Sud*, Paris, 1883, p. 446.

⁴ Marcial Hernandez: *Sinopsis de historia de Venezuela, Maracaibo*, 1914, p. 7. This writer does not give the source whence he derived this information.

⁵ Wilhelm Sievers: *Venezuela und die deutschen Interessen, Angewandte Geographie*, Ser. I, Part III, Halle, 1903, pp. 17-18.



FIG. 1 - The plain between La Villa and Arimpia. The trails from one settlement to another are hard to find as they run apparently aimlessly over the savana.

from the shores of Lake Maracaibo, but these attempts appear to have been generally defeated by the hostile Motilone Indians, who were well able to cope with the invaders. The city of Maracaibo appears from the first to have been a stronghold from which the eastern shores of the lake were dominated, while the colonization of the western shores, with their hostile aborigines, was deferred until the eighteenth century. Between the years 1779 and 1792 the Capuchins of Navarre established ten missions west of the lake, in which were about 1,000 baptized Indians and 300 unbaptized.⁶ These missions were subsequently destroyed by Indian uprisings, but they undoubtedly were directly responsible for the colonization of the surrounding districts.

THE DISTRICT OF PERIJÁ

The state of Zulia, which almost completely encompasses Lake Maracaibo, is divided into various political divisions named districts. This paper deals mainly with the District of Perijá, which lies west of the central part of Lake Maracaibo. It is bounded to the north by the Palmar River, to the west by the crest of the Sierra de Perijá, and to the south by the Santa Ana River. The capital of the district is Machiques (Libertad). According to the census of 1909, this district has a population of 5,512.⁷

ITS RIVERS

The district is watered by the Palmar River, whose tributaries—Tosas, Laja, and Tapias—rise in the Sierra de Perijá; the San Juan and San Ignacio Rivers, which find their origin in the plains near La Villa; the Apón River, which also originates in the Sierra de Perijá, together with its tributaries the Aponcito, the Macoa, and the Cogollo; and the Santa Ana River, with its tributaries the Rio Negro, Rio Yasa, and Tucuco, which likewise comes from the Sierra de Perijá. Outside of these there are various smaller creeks, such as the Arguaco, the La Gé, the Motilone, and the Cuiva, which, in the rainy season, serve to irrigate the country.

It can be noted upon the map of the province of Maracaibo in Codazzi's Atlas⁸ that the Palmar, Apón, Rio Negro, and Santa Ana Rivers are shown as being navigable for a considerable distance from their mouths in Lake Maracaibo. It would appear as if the celebrated geographer depended too much upon hearsay information in this matter. The Palmar River is

⁶ Anuario estadístico de la Sección Zulia, Maracaibo, 1886, Vol. 1, pp. 57-58.

⁷ L. V. Dalton: Venezuela, London, 1912, p. 273. Sanchez (*op. cit.*, pp. 65-66) states that by the census of 1881 the district was officially credited with 4,346 inhabitants but that in his opinion it had at least 8,000 inhabitants. The writer shares this opinion for the census of 1909, believing that the census must have been carelessly taken and have failed to enumerate hundreds of the scattered families that live upon the savanas. This estimate also probably does not take into account the Indians living west and south of Machiques, the number of which cannot be determined. Ernst (A. Ernst: Un cráneo motilón, *Rev. Cientif. Univ. Centr. de Venezuela*, Vol. 1 (n. d.), pp. 119-124) states that "no one has up to the present time seen the plantations of the Motilones nor knows with certainty if they have any fixed abodes; in consequence the number of these aborigines cannot be approximated."

⁸ Agustín Codazzi: Atlas físico y político de la República de Venezuela, Caracas, 1840.

navigable for some ten miles from its mouth, but only for canoes. The Apón is navigable for a distance of twelve miles from the lake, as far as the point called Palo Gordo, but only for canoes. A great deal of the commerce between Machiques and Maracaibo is transported by the lake and up this river to Palo Gordo, from where it is but a short distance overland to Machiques. The Santa Ana is said to be navigable for a considerable distance, but the writer is informed by settlers along the lake shore that the dangers of Indian raids make the navigation of the



FIG. 2—The La Gé River near La Quebrada.



FIG. 4—The Aponcito River at the crossing between Machiques and El Llano.

(Figs. 2, 3, 4, and 5 represent, in the order named, the typical aspect of the rivers of the western Maracaibo lowland in their course from the mountains to the lake.)

upper waters of this river impracticable. Virtually the entire region south of Machiques as far as the river Catatumbo in the District of Colón is impenetrable for this reason.

Some of the smaller rivers of the Perijá district carry water in their lower courses only during the rainy season. Owing to the porosity of the lake plain all the rivers, without a single exception, carry a larger volume of water where they break through the Sierra de Perijá than at their mouths in Lake Maracaibo. The upper beds of all of them consist of boulders and rocks of various sizes that have been brought down from the Sierra (Fig. 2). The rivers here have an impetuous current, due to the sudden drop in elevation. Soon, however, the number of boulders grows less, and the river bed consists of half boulders and half gravel (Fig. 3). At length, about one-third the way across the plain, the river beds

consist of nothing but sand (Fig. 4). Several of the rivers finally lose themselves entirely, and naught remains but a dry, sandy strip forming a sharp contrast to the surrounding savana-covered plains (Fig. 5). The



FIG. 3 (upper)—The Macoita River at the crossing between Machiques and El Llano.

FIG. 5 (lower) —A *cañada*, or dry river bed, near San Juan.

natives make use of these dry river beds, *cañadas*, as they are called, to dig shallow depressions from which fresh water can be obtained at any season of the year.

ITS CLIMATE

The climate of the western shore of Lake Maracaibo in general is quite healthful. Sievers states that Maracaibo is one of the warmest places in

South America and that it has an average yearly temperature of between 22° and 27° C. (72° to 80° F.) He also states that afternoon temperatures of 35° C. (95° F.) are reached. In these statements Sievers is justified, but his contention⁹ that Maracaibo is to be especially feared climatically is far from being correct. While it is true that occasional outbursts of yellow fever have taken place in Maracaibo itself, this was due more to a lack of precautionary measures than to any other cause; in the healthier regions west and south of the city yellow fever is unknown. A more cheerful view of the climate is taken by Plümacher, who considers Maracaibo extremely healthful and as evidence cites that the death rate is but about one-half the birth rate.¹⁰

The rainy season in the regions west of Lake Maracaibo extends from about the first of May until the end of July. The month of August is fairly dry, while the middle of September again sees the commencement of heavy precipitation, which lasts through October and November until about the first part of December. June, October, and November are the wettest months. At other times of the year there is hardly any rainfall, and these are of course the months when travel west of the lake is at its best.

THE CITY OF MARACAIBO

Maracaibo is a thriving city, in size the second in Venezuela. Its exports are larger than those of La Guaira, the port of Caracas. While the first settlement here was founded by Alfinger in 1529, it was destroyed by the Indians shortly afterwards; it was not until 1571 that Alonzo de Pacheco founded the present city and named it Nueva Zamora.¹¹ According to the census of 1909, the town has a population of 37,551 inhabitants,¹² but competent local authorities place the number greatly in excess of this figure. The city is laid out regularly and has some beautiful plazas and public buildings. It presents a bustling appearance, and the amount of export goods carried through its streets gives one a fair idea of the prosperity of the interior states. The commerce from the region to the west of the Cordillera de Mérida and that of the eastern part of the Colombian state of Santander passes through Maracaibo by way of the Zulia and Catatumbo Rivers and the lake. Possibly one-half of the so-called Maracaibo coffee comes from the Andean states of Venezuela and the other half from the state of Santander, as no coffee at all is produced within a hundred miles of the town.

THE THREE TYPES OF COUNTRY BETWEEN LAKE MARACAIBO AND THE SIERRA DE PERIJÁ

After landing in Maracaibo, the writer decided to proceed overland to La Horqueta, a station of the Caribbean Petroleum Company at the foot

⁹ Sievers, *op. cit.*, pp. 31-32.

¹¹ Dalton, *op. cit.*, p. 151.

¹⁰ O. Plümacher: Maracaibo, *Das Ausland*, Vol. 61, 1888, p. 812.

¹² Dalton, *op. cit.*, p. 273.

of the Sierra de Perijá preparatory to his expedition into the interior of the range, described in a previous article.¹³ The usual route to this camp is by water down the western shore of the lake to Iguana Point and then overland to La Horqueta. As this route would not afford an opportunity for studying the topography of the region, it was decided to take the longer overland route in a southwesterly direction from Maracaibo. On this route three distinct zones are met with before arriving at the foot of the Sierra de Perijá.¹⁴



FIG. 6—A plantation of divi-divi trees along the road between Maracaibo and La Pua. These trees are grown for their seeds, which contain tannic acid, used in tanning.

The Arid Coastal Zone

The first zone may be named the arid coastal zone. It consists of a broad, arid belt upon which is seen the typical vegetation found in these latitudes along portions of the seacoast where a scant rainfall is experienced or where the porous nature of the soil is such that the rainfall is speedily absorbed without giving rise to vegetation and its attendant humus. The appearance of the country directly west of the city of Maracaibo, to the eye of the writer, is identical with the landscapes of the island of Margarita off the Venezuelan coast to the eastward—a sandy waste upon which caeti, shrubs, and smaller trees alone succeeded in obtaining a foothold. Following the road from Maracaibo to the southwest one sees here and there small *ranchos* where goats provide their owners with a precarious living. Outside

¹³ An Exploration of the Sierra de Perijá, Venezuela, *Geogr. Rev.*, Nov., 1918, pp. 385-410.

¹⁴ A valuable map of the vegetation of northern Venezuela, 1:3,000,000, forms one of a series of three maps on the same scale (the other two showing geological structure and relief) by W. Sievers, accompanied by explanatory text (Karten zur physikalischen Geographie Venezuelas, *Petermanns Mitt.*, Vol. 42, 1896, pp. 125-129, 149-155, 197-201, with Pls. 10, 11, 15; reference on pp. 197-200 and Pl. 15).

of doves, hawks, parrakeets, and owls, one sees but little wild animal life in this zone. The roads are heavy, deep in sand, and level. Here and there a small hummock of reddish shale, perhaps five meters high, raises itself above the general level. All in all, the scenery is depressing in the extreme. The glare of the sun is incredibly strong, and the traveler who comes unprovided with a canteen will suffer exceedingly from thirst, no wells or water holes with water fit to drink being found after one leaves Maracaibo. In one or two instances small plantations of umbrella-like divi-divi trees (*Caesalpinia coraria*; see Fig. 6) are seen. The seeds of these trees contain a large proportion of tannic and gallic acid; they are used extensively in the local tanneries and are also exported to northern markets. Just outside of Maracaibo one crosses the dry bed of a river whose course appears to have changed to the northward; it is the local custom to dig shallow wells in the sandy bottom of this former water-course from which water may be obtained that is but slightly brackish.

The arid coastal zone continues inland for a distance of about 30 kilometers. The road from Maracaibo passes two important ranchos, that of El Palotal (about 12 km. from Maracaibo) and that of Rincon la Vera (about 14 km. from Maracaibo). At these two places large depressions in the soil serve to collect rain water. Thus the owner is enabled to raise fairly large herds of cattle, which feed upon the wiry grass and the leaves of low bushes that go to make up the scant vegetation of these parts. The products of these cattle in the shape of milk, cheese, and hides are sent to Maracaibo. After passing these two ranchos one begins to notice a change in the aspect of the country. The shrubs are not so abundant, and larger trees are seen here and there. The soil formation, however, is still practically the same, and the country retains its level aspect. About halfway between Maracaibo and Monte Verde lies the small settlement of La Pua, consisting of a *tienda* (small shop) and two or three small huts. Minor supplies can be purchased here.

The Dry-Forest Zone

THE WAY STATION OF MONTE VERDE

One enters the second zone, which may be called the dry-forest zone, at Monte Verde. This place is appropriately named "green woods," as here begins the wooded belt, with a width of about 45 kilometers. Monte Verde itself is naught but an open structure that serves as a resting place for the pack trains carrying supplies to the interior—merely a larger edition of the Indian huts of the mountains. A stockade encloses a space around the building, which consists of a thatched roof supported by poles. A caretaker lives nearby, to whose lot it falls to cut the fodder for the arriving pack animals. For this he makes a small fixed charge, but there is no charge for the use of the rest house. Half of the floor area of the rancho

bears a raised wooden platform upon which the travelers swing their hammocks; the other half has a mud pavement which is used to build fires for cooking food. A night scene in one of these ranchos is singularly weird. The flickering fires form a strong contrast to the gloom of the surrounding forest. In the gently swaying hammocks the chatter of travelers at times drowns even the noise of the howling monkeys far off



FIG. 7—Ferry across the Palmar River at Paso de la Candelaria.

in the forest. After a while the occupants of the hammocks grow silent, and the wild life of the woods has the night to itself, the crickets and howlers ably supported by the myriads of frogs in the nearby ponds.

THE CHARACTER OF THE WOODLAND

The wooded zone supports large trees, the giant *ceiba* being one of the predominant varieties. Large numbers of valuable cedar trees can also be observed. Very little underbrush is seen, and it would appear as if each giant tree required all the nourishment which the shallow soil covering the underlying sand could give and as if nothing were left to sustain smaller vegetation. The soil is still sandy and the road level. Here and there a palm tree raises its stately crest. During the rainy season the road is generally covered with water. Owing to the sandy soil no mud is formed, and in consequence travel is possible at any time of the year.

MONTE VERDE TO THE PALMAR RIVER

From Monte Verde to the crossing of the Palmar River the country is almost uninhabited. The reason for this is that with one or two exceptions no pasturage is found for cattle, nor is there soil that would make an agricultural enterprise successful. Four ponds, at Preveneión, San Pedro, San Isidro, and San Pablo, border the road, so that the traveler need not take the same precautions against thirst as were necessary between Maracaibo and Monte Verde. Small cattle farms are found near the last three



FIG. 8—A street in La Villa.

of these ponds, but there is no possibility of obtaining supplies here, as the owners live in dire poverty. Beyond the invariable eup of coffee, which is duly prepared as an act of courtesy for any arriving traveler, it is impossible to obtain any provisions except some green plantains.

MORE DENSELY WOODED RIVERINE BELT

Before reaching the ford of the Palmar River, we find in the second zone a higher degree of fertility. The humus covering the sandy soil becomes deeper, and the forest has a denser appearance. The woods here are peopled with monkeys, jaguars, tapirs, peccaries, wild boars, and birds of all descriptions, such as curassows, wild turkeys, partridges, parrots, pigeons, and macaws. The traveler is astonished at the faunal riches of this district. It proves to be a sportsman's paradise. Large swarms of butterflies cluster around the water puddles in the road and on being disturbed fly up in such numbers as almost to obscure one's vision.

THE PALMAR RIVER

At the ford of the Palmar River, named Paso de la Candelaria (Fig. 7), the stream is about 120 feet wide and can be crossed on horseback during the

dry season. During rainy weather the river frequently is so high that the traveler must cross by canoe while the animals swim. Occasionally even the current becomes so swift that the traveler is obliged to wait upon the banks until the waters subside. The river is not navigable, as reports state that it loses itself in swampy marshes some distance below the ford and does not recover its channel until within a short distance from its mouth in Lake Maracaibo. A toll is levied by the government upon all travelers and animals that cross the river, and ferrymen and toll gatherers



FIG. 9—Typical native houses near La Villa. The house on the right is made of intertwined boughs plastered with mud.

are stationed at the ford. At Paso de la Candelaria also is found a large cattle ranch with excellent pasturage. Here are produced large quantities of the typical white cheese that can be seen in the Maracaibo markets.

The forest zone continues for a considerable distance beyond the river. The country now becomes slightly rolling, and it may be noted that the original sandy lake bottom has been covered with the more fertile deposits that have washed down from the Sierra de Perijá.

The Savana Zone

THE TOWN OF LA VILLA

About three hours' ride from Paso de la Candelaria, a short distance before the ancient town of La Villa is reached, the forest opens and one enters the third zone. This is a belt about 15 kilometers wide. In reality it is a plateau with an elevation of about 300 feet where erosion in places has cut small valleys, leaving low hills that overlook the mountains and the intervening ravines. These low, rolling plains are crossed here and there by ridges of white sandstone that are in general parallel with the

mountains and die out as soon as they approach the Palmar River. The low portions consist in the main of gravel and boulder-covered terraces of uneven character. This third zone may be called the savana zone and extends to the foot of the Sierra de Perijá. Small clumps of trees dot the grass-covered savana. The grass is not high even in the rainy season and resembles dune or broom grass. A few huts and some horses, cattle, sheep, and goats indicate that this zone is slightly more populated than the two previously described regions. The town of La Villa, officially known as La Villa de Rosario de Perijá, and not as "Perijá," as it is marked on many maps, consists of about one hundred houses and is irregularly laid out (Fig. 8). La Villa was also known during the Guzman-Blanco administration as "Federación," and during the same epoch the district which is now the District of Perijá was known as the "Distrito Guzman-Blanco." It may be mentioned that this renaming of towns, districts, and states in Venezuela has caused a great deal of confusion in the past and makes the reading of maps difficult. La Villa is the residence of the *alcalde* of the municipality of Perijá, the other municipality of the district being that of Machiques.

According to Sanchez, the town of La Villa was founded by families from the Canary Islands in 1800.¹⁵ The writer is of the opinion that this information is incorrect, as he personally inspected the church records of La Villa, which go back to the year 1781. Judging by the architecture of its church the town is of far greater antiquity. It may be mentioned incidentally that Sanchez states that the savana surrounding La Villa is named the "Sabana de Sartanejo." According to the local authorities La Villa has about 250 inhabitants, many of the houses being unoccupied for the larger part of the year. It is a sort of recuperating resort for the landowners from regions to the north and west. They are in the habit of occasionally spending a week or two here, the climate of the place being famed for its salubrity. That La Villa was a more important settlement in former days can be judged from the numerous ruined house foundations that still exist. There is now but little traffic. A shop or two seem to suffice for the needs of the inhabitants and of the surrounding country. Many of the houses still retain traces of the favorite architectural vagaries of the early settlers. This is especially noticeable in the curious windows with their wooden grills.

BETWEEN LA VILLA AND THE SIERRA

Beyond La Villa the country becomes more thickly settled. Many little huts are seen, made of intertwined boughs that have been plastered with mud (Fig. 9). One is struck by the patriarchal mode of living of the settlers, who appear to be almost entirely independent of the outside world and can produce almost all they need without having to go elsewhere.

¹⁵ Sanchez, *op. cit.*, p. 63.

The Sierra de Perijá now comes into view (see Fig. 1 in first article, p. 388). It would be hard indeed to describe its beauties and its grandeur. When it is approached from the east in the afternoon, the sun seems to accentuate the cloud masses that drift along the ridges. The vegetation on the mountains is scarcely visible against the light of the sun, and the entire ridge appears covered with a bluish haze. From the Venezuelan side the Sierra de Perijá undoubtedly presents a different aspect from that seen from the Colombian valleys. While the range is reported to be partly devoid of vegetation on its western slopes, it is densely forested on



FIG. 10—The Ciénaga de Arimpia, a shallow lake, typical of the western Maracaibo lowland, which dries up in the dry season.

the eastern. Vegetation appears to extend to the crest of every ridge; no bare places are seen at all. One can clearly make out the waterfall of the Cogollo River, the white strip of this cascade being in sharp contrast to the deep green of the surrounding vegetation.

Numerous small hills now begin to put in an appearance. These cannot be called the foothills of the Sierra de Perijá as they are totally detached and appear like isolated islands on the savana. None of them have elevations of over 100 feet. It is not unusual to find swamps and small lakes between the ridges. Owing to the peculiar formation of the soil, quicksands frequently form in these swamps and offer a serious menace to the unwary traveler. Reports that travelers have been engulfed in these quicksands are not uncommon.

The savanas end near the ridges of the Sierra de Perijá. Before we reach these ridges several shallow lakes have to be passed, of which the largest is the Ciénaga de Arimpia (Fig. 10), which has a considerable area during the rainy season but dries up almost entirely at other times of the

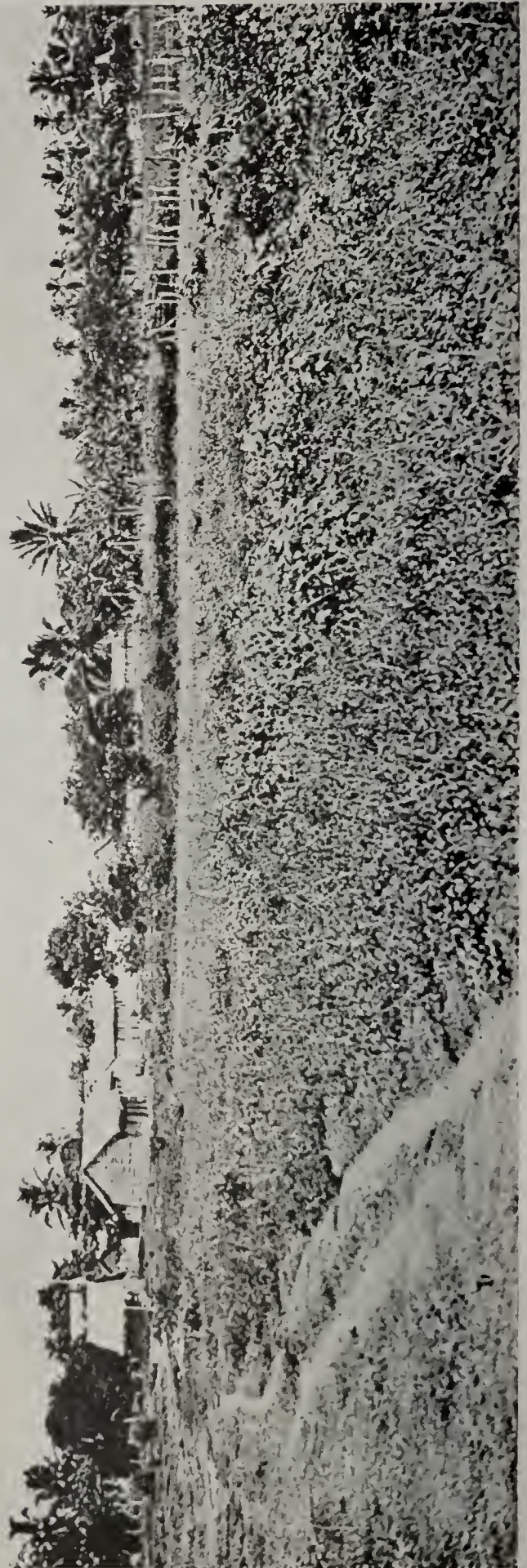


FIG. 11—Outskirts of the town of Machiques. Sierra de Perijá in the background.

year. Near this lake is found the settlement of La Horqueta, where the station of the Caribbean Petroleum Company is located. This station consists of a large thatched bungalow for the use of officials and a mess room. Both houses are enclosed in mosquito netting—a great blessing to the traveler in a country where mosquitoes are found in incredible quantities. Besides these buildings a number of sheds for machinery, houses for the workmen, etc., are included in the settlement.

The Region Along the Foot of the Range

BETWEEN LA HORQUETA AND MACHIKUES

The country between La Horqueta and Machiques consists for the greater part of savana and is only wooded in the belts following the water-courses. There are two routes that are in general use for travel to Machiques: one, an inner route with reference to the mountains, leading from the settlement of Arimpia southwest via El Rodeo and El Llano; the other, an outer route, running southeast to San Juan and then southwest via Villa Vieja to San Rafael and thence to Machiques. The advantage of the outer route is that in the rainy season one is not held up at the crossings of various rivers. The outer route, however, besides being considerably longer, has the disadvantage that it leads almost entirely over open savana, which makes travel in the heat of the day a severe hardship.

The first settlement of size one reaches on following the outer route after leaving La Horqueta is that of Arimpia. This consists of at least fifty houses scattered over the savana. Each house has its grazing lands, so that the distance between any two houses may be as much as half a mile. The inhabitants of Arimpia, in fact the inhabitants of all the settlements between Arimpia and Machiques, depend for a living almost exclusively upon the raising of cattle, goats, and sheep. The trails from one settlement to another are hard to find as the animals have made so many paths on the savana that these are frequently mistaken for the road (Fig. 1). Bird life on the savana appears to differ greatly from the bird life that is found in the wooded zone. Undoubtedly the savanas would prove a rich field to ornithologists, as the casual observer is struck with the immense number of species seen, running all the way from the large storks and cranes that frequent the swamps to the smallest sized humming birds.

The next settlement of size met with on this road is that of San Juan, consisting of about thirty huts. The inhabitants of San Juan appear to have specialized in the raising of sheep, instead of the usual goats. The grass here appears to be a trifle more nutritious than it is in other parts. This is probably accounted for by the fact that a large depression exists south of San Juan from which the surrounding country derives a great deal of moisture. In consequence the aspect of the savana is greener, and, with its clumps of trees, resembles, when viewed from a distance, nothing

so much as a Kentish meadow studded with untidy orchards. On the hummocks north and south of San Juan can also be seen clumps of coconut trees; in fact similar groves are not unusual throughout the entire Perijá district, additional evidence that the soil here was at one time sea bottom and is still sufficiently impregnated with salt to permit proper cultivation of coconut trees. It is a curious and unusual sight to come across bearing coconut trees at such a distance from the sea.

After passing San Juan, the road leads to the east of a large swamp called El Pintado. Beyond this one passes two small settlements, San Ignacio and Villa Vieja. The road now takes an abrupt turn to the southwest, enters the densely wooded zone of the Apón River, and crosses this river at the ford of San Rafael. The wooded belt here has a width of about 12 kilometers and is not left until just before one reaches the settlement of Las Piedras, halfway from the ford to Machiques.

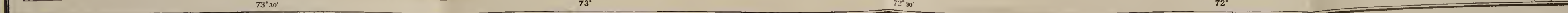
THE TOWN OF MACHIQUES

The town of Machiques (Fig. 11) is situated on the southern bank of the Apón River, which, according to Sanchez, is also named the Rio Figma.¹⁶ It consists of about 300 houses and perhaps 2,000 inhabitants, although the natives claim that 4,000 people live in the town itself and 6,000 in the immediate neighborhood. The town is not located advantageously, as it is built upon a level plateau with an altitude of about 400 feet, which is sometimes partly inundated by the Apón. The town is built in two parts, separated by a swamp which does not tend to improve the health of the inhabitants.

Machiques is the residence of the Governor of Perijá. The town is also named Libertad, which is a survival of the Guzman-Blanco administration and appears to have been retained longer than the name of Federación for La Villa. The writer cannot explain the origin of either the word Machiques or Perijá. Machiques is a comparatively new settlement. Judging from its architecture and from local traditions, it cannot be more than fifty years old. The church and the government office are the only public structures of any distinction. None of the houses have two stories, and they are all of the same architectural simplicity, consisting generally of one room divided by a flimsy partition. Unlike the older residences of La Villa, but very few houses are seen in Machiques that have the tiled roofs so typical of the older Spanish-American settlements. Instead, they are provided with the thatched roof of palm leaves found on the huts of the savana.

The inhabitants of Machiques depend largely upon the cattle farms that surround it for their livelihood. Various landed proprietors reside in the town when not living upon their estates. Furthermore, Machiques is the center of imports from Maracaibo for distribution through the coun-

¹⁶ Sanchez, *op. cit.*, p. 63.



FALLS OF THE MACOITA RIVER

Approximate Scale of miles

0 1 2

tryside. The district due west from Machiques as far as the Sierra de Perijá is quite fertile, being covered with the deposits of the Apón River, so that large *potreros* afford abundant pasturage for cattle.

THE COUNTRY SOUTH OF MACHIQUES

The country directly to the south of Machiques is uninhabited as far as the Catatumbo River, as raids by the Indian tribes have put a stop to all enterprises in this region. Formerly there existed a road from Machiques to El Pilar on the Catatumbo, but this road has not been used for at least one hundred years and all traces of it have disappeared. No inhabitant of Machiques ventures farther than Los Cañitos, the cattle ranch due south from the town on the northern bank of the Yasa River. Some few years ago the Caribbean Petroleum Company of Philadelphia sent a large armed expedition into this region in order to explore the country between the Yasa and the Santa Ana; but, after months of incredible hardships and after having succeeded in penetrating the unknown area but a short distance, this expedition had to return. Despite constant care one of the laborers that went with the party was killed from ambush by the Indians, and, had the party been less heavily guarded, it is probable that none would have returned. South of the Yasa live the dreaded Motilones and more particularly the Parirí, Tucucu, and Rio Negro sub-tribes. Reports also speak of a semi-arboreal tribe of Indians named Porotos, whose alleged ferocity is dreaded even by the Motilones. This country undoubtedly offers great possibilities for canoe exploration from the mouth of the Santa Ana River in Lake Maracaibo to its source and to the headwaters of its tributaries. This is probably one of the most interesting ethnological fields in South America still unexplored.

A fact that may be of interest to paleontologists looking for new fields of exploration is that the inhabitants of Machiques report finding, in close proximity to the town, immense bones of prehistoric animals that resemble mastodons.

FROM MACHIQUES NORTH TO LA HORQUETA

Returning from Machiques to La Horqueta by the route lying nearest to the Sierra de Perijá, one has to cross the Apón River at a ford about half a mile from the town. The Apón here still retains a great deal of the impetuosity that characterizes its course in the mountains and during the rainy season is frequently so turbulent that crossing becomes impossible. The stream here has a rocky bed and is not over three feet deep in the middle during normal times.

Before reaching the important settlement of El Llano one has to cross the Aponcito and the Macoita (Fig. 3)—a matter which, during the dry season, presents no difficulty. El Llano is a collection of about thirty scattered ranchos. Due west from the crossing of the Macoita River, at the very



FIG. 12—View looking east and southeast over the plain from a low hill known as Pueblo Viejo. Note the savana vegetation, becoming more densely wooded on the right, toward the Apón River.

foot of the Sierra de Perijá, are found the remains of one of the ten missions of the Capuehins of Navarre, on a low hilltop which is to-day known as "Pueblo Viejo" (Old Town). In this region the writer conducted archeological investigations after returning from his sojourn among the Maeoa Indians in the interior of the mountain range. Here were found the remains of an ancient civilization resembling in culture that of the Arhuaco Indians of Colombia. While this archeological work was more in the nature of a reconnaissance, enough antiquities were found to convince the writer of great possibilities in future investigation.

After passing El Llano, one comes to the fords of the Motilone and Cogollo Rivers, the latter being the deeper and, in the rainy season, the more dangerous to cross. It is because of these five crossings (the Apón, Aponeito, Maeoita, Motilone, and Cogollo Rivers) that this inner road is not taken during the rainy season, travelers preferring to take the longer, but easier route which entails only the crossing of the Apón. After fording the Cogollo one reaches the small settlement of El Rodeo, crosses a wide strip of savana, and arrives at Arimpia.

There is still another road from Maehiques and La Horqueta that one can take, providing the services of a good guide can be procured. This road runs directly along the foot of the mountains and over a broken country. It

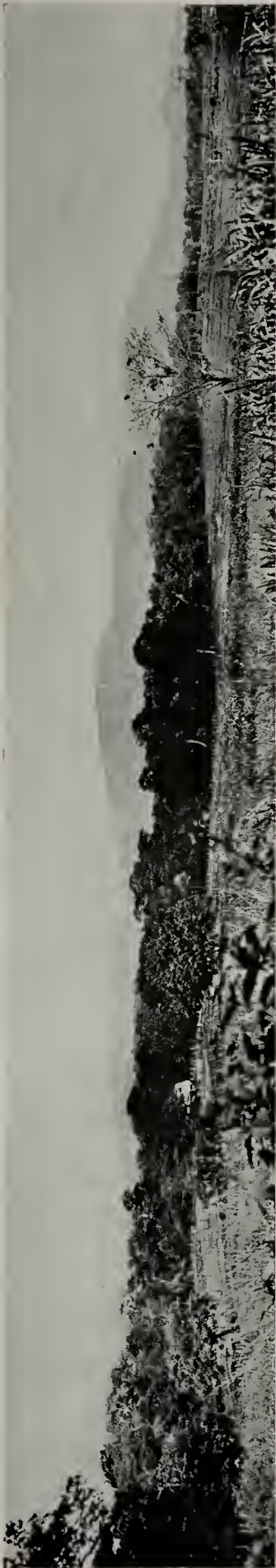


FIG. 13—Pasture land at the foot of the Sierra de Perijá near La Quebrada. The decreasing elevation of the range toward the north (right) is shown.

leads from Machiques to a very small settlement called Las Delicias, thence to a cattle farm on the Cuiba River—a tributary of the Cogollo—and from here via another cattle farm named Pascual to the Coruba station of the Caribbean Petroleum Company on the Cogollo. From Coruba to La Horqueta this company has built a wide tractor road. This route leads for the greater part through the virgin woods along the mountain slopes and repays in beauty what it lacks in comfort.

THE REGION NORTH OF LA HORQUETA

In general, the country north of La Horqueta presents no aspect different from that of the region to the south. The La Gé River, a tributary of the Palmar, resembles in every way the tributaries of the Apón (Fig. 2). Strips of woodland are found along the streams, but otherwise the country can again be classified as belonging to the savana zone previously mentioned. The writer did not go farther north than the cattle farm of La Quebrada, where is found some of the best *potrero* land in the Perijá district (Fig. 13).

ONE DRAWBACK TO TRAVEL IN THE PERIJÁ DISTRICT

In general, travel in the Perijá district is pleasant. The inhabitants, while not living on a pretentious scale, are unusually hospitable and invariably kind to the stranger in their midst. The danger from snakes, although very real, is a small drawback to anyone provided with boots and leggings. The climate is good and not oppressively hot. It is only during the rainy season that travel is at times difficult.

There is, however, one great drawback to a sojourn in this region. While seemingly small, this drawback assumes proportions that may lead to grave consequences, and the writer suffered severely from it. As he does not possess the pen of a Whitney, he can do no better than quote this author's description *verbatim*.¹⁷

¹⁷ Caspar Whitney: *The Flowing Road*, Philadelphia, 1912, pp. 237-238.

Known to Central America and Mexico as the red-bug, the *garrapata* is the tick of Venezuela, and breeds in four sizes of malignance; the largest as large as a full grown bedbug, the smallest little bigger than a pen point. These in all their sizes infest the brush and the grass. The low branches that sweep your hat as you ride, the bush that drags across your legs in the saddle, the grass through which you walk, the log upon which you rest, each and sundry, as the idiom goes, supplies its quota of swarming, biting *garrapatas*. And the smallest is the arch fiend of the lot, for not only is it so tiny as to be all but invisible, but it burrows into your skin immediately upon contact.

. . . On returning to the camp, every man went at once to the fire, where, divesting himself of all clothing, he held the different articles over the flames to loosen the grip of the insect so it might be shaken off . . . Then standing nude, search for those on his body would be instituted by a fellow sufferer, whose back in turn he explored later.

It was found by the writer that bathing in water containing a very strong infusion of crude native tobacco had the effect of ridding the body of the smaller variety of ticks. Furthermore, the writer found, to his sorrow, that scratching the tick bites resulted in bad and painful infections which were slow to heal and caused him a great deal of suffering and annoyance.

A COMBINED MAP AND PANORAMA FOR ORIENTATION FROM LOOKOUT STATIONS

By EMANUEL FRITZ

U. S. Forest Service

[With separate illustration, Pl. XVIII, facing p. 502]

Of interest to geographers is a device combining a map and a panorama that has recently come into wide use in forest protection organizations as an adjunct to lookout stations in locating forest fires. It shows in a vivid manner the appearance of the entire stretch of country surrounding a lookout station just as it appears to the lookout man. Where a photograph would show the panorama as a flat rectangular picture, this device shows it just as it is—"bent" around a central point.

DESCRIPTION OF THE MAP AND PANORAMA

Reference to the illustration (Pl. XVIII) shows the device to be circular—the original is 26 inches in diameter—the map occupying an inner circle 20 inches in diameter and the panorama the 3-inch annular space remaining between its outer edge and the outer limit of the drawing. For the map the proper portions of the standard topographic sheets published by the U. S. Geological Survey are used or, if these are not available, some suitable other map on the same scale. The panorama is the distinctive feature of the device. In a rough country the panorama as drawn will consist of a number of irregular lines, each representing a ridge or mountain crest. The lines farthest from the center indicate the farthestmost ridges and mountains and the horizon. The name of each mountain or other conspicuous natural object is lettered below the line representing it. The space between two ridge lines naturally indicates a valley, and in such space is written the name of the stream occupying it. Objects of culture—railroads, settlements, mines, etc.—are also drawn in and labeled. The relief is not sketched in freehand but is carefully drawn with a special and ingenious but very simple alidade. With the aid of this instrument each ridge line drawn as part of the panorama bears its proper relation in size, position, and shape to those neighboring it. When such a device is "set up" on a lookout point and properly oriented, any one can learn from it the name of each feature lying in his view by sighting across its center at the actual feature, then picking out the line on the panorama portion corresponding to it in shape and position and reading its name. Knowing its name, more can be learned as to its location, surroundings, and character from the map in the center.

THE SPECIAL ALIDADE

The alidade used in drawing the panorama portion is very simple (Fig. 1). It consists of a solid main bar having a pivot ten inches from one end

on its under side. On one end of this bar is a fixed vertical arm and on the other a hinged inclined arm. Both arms are hollow and have within



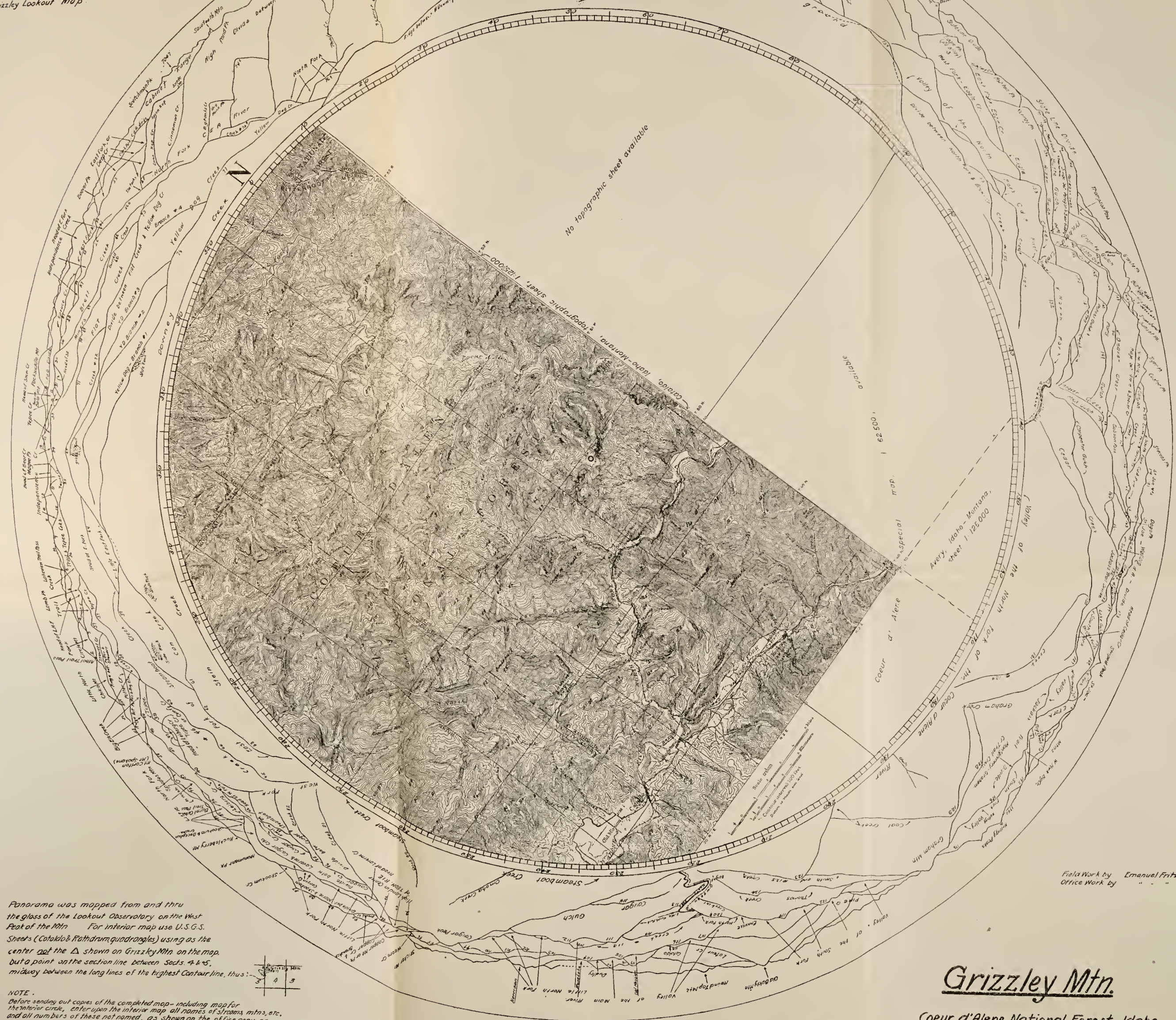
FIG. 1—Special alidade used for making circular panoramas. For description, see the text.

them solid bars, which can be made to move up or down by rack and pinion arrangements. The upper end of each bar projects from the tubular arm,



FIG. 2—Circular plane table with alidade used in making the panorama resting on it.

the one in the vertical arm having near its outer end a small peep hole and the one in the inclined arm being fitted with an inverted-V gunsight. On



No topographic sheet available

Coeur d'Alene River

Avery, Idaho-Montana, 122,000

Grizzly Mtn.

Coeur d'Alene National Forest, Idaho.

Panorama was mapped from and thru the glass of the Lookout Observatory on the West Peak of the Mtn. For interior map use U.S.G.S. Sheets (Cotahlo & Rathdrum quadrangles) using as the center not the Δ shown on Grizzly Mtn. on the map, but a point on the section line between Sects. 4 & 5, midway between the long lines of the highest Contour line, thus:

NOTE:
Before sending out copies of the completed map - including map for the interior circle, enter upon the interior map all names of streams, mtns, etc., and all numbers of these not named, as shown on the office copy or master U.S.G.S. Sheets, filed with this tracing.
If corrections or additions are made, make record in upper-right corner, with date & initials

A COMBINED MAP AND PANORAMA

the lower end of this latter bar is fixed a blunt pointed prieker which projects from the face of the hollow tube through a narrow slot. As the gunsight is raised or lowered the prieker therefore moves with it.

MAKING THE PANORAMA

To make a panorama the alidade is placed on a leveled circular plane table and the pivot fitted into a small hole in the center of the table. After several simple adjustments are made the draftsman is ready to start mapping or drawing the panorama. He sights through the peep hole (after once being adjusted the bar with the peep hole is fixed in one position throughout the mapping) at a point on the feature to be drawn, then raises or lowers the gunsight on the inclined or front arm until it comes into the line of sight. This done, the arm is depressed on its hinge and a point is caused to be recorded on the paper by the small prieker. The arm is again raised, the alidade turned slightly on its pivot and a sight taken at another point on the same feature, and a point pricked on the paper. If the feature is a peak and the first sight was made at its top and the second at a point to the right or left of the top, the front sight must be lowered to bring it into the second line of sight. Thus the second point and succeeding points representing sights at successively lower places on the slopes of the peak are closer to the center of the map than the first representing the top of the peak. By joining all the points thus made an outline of the peak and its slopes will appear on the paper of the same proportion and shape as it looks to the observer. Other features are drawn in the same manner, and eventually all of them are sketched. The result is a circular panorama disposed about a center and corresponding with great fidelity in appearance and proportion to the actual. It only remains then to add the names of all features. This is done from the draftsman's knowledge as gained from familiarity with the region and from the study of existing standard maps.

USES OF THE DEVICE

As an aid in teaching a new lookout man the names and locations of all features lying in his view, thus greatly improving his accuracy in describing and reporting locations of forest fires, this type of combined map and panorama is unexcelled. In the state of New Hampshire, where many of the lookout stations for which such devices have been made are also popular points among campers and sightseers, the maps have excited the greatest interest and have added to the tourist's pleasure in making of the jumbled mass of mountains before him a well-ordered and definite series of distinctively named features that he can talk about and refer to by name.

THE INDIANS OF THE GREAT LAKES REGION AND THEIR ENVIRONMENT

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At the beginning of the historic period in America, the American Indians were widely distributed. They had been in their new home sufficiently long to have adjusted their habits and customs to the peculiarities of their environment and had developed sufficient differences in speech to be classified into linguistic families. Three main families were found living in the Great Lakes region: (1) the Iroquoian (the Five Nations of New York, the Hurons, and the Neutrals); (2) the Algonquian, which included most of the tribes about the Great Lakes; and (3) the Siouan, located in the plains to the west of the lakes but represented by one tribe, the Winnebago, in Wisconsin.

THE FIVE NATIONS

The Five Nations of New York, the leading members of the Iroquoian family, were for the most part non-migratory tribes. Their geographic position and environment were especially favorable for their economic welfare and their political unity and expansion. They had developed "hoe" or "garden" agriculture to a high stage, the chase furnishing only a small portion of their food. Means of transportation being inadequate, their sustenance area for most of their food was small. Only through well-advanced methods in the exploitation of their resources were they able to support so dense and numerous a population.

Their strategic position gave them advantage over the surrounding tribes. Waterways from their highland home led in all directions. Down any of these they were able to pass quickly, strike their blow, and return at leisure.¹ Their non-migratory habits, dense population, and compact central position enabled them to develop a political and military organization that was a marvel for strength and of which they were justly proud. Schoolcraft is authority for the statement that at one time a noted Iroquois suggested to a colonial official that the weak, struggling English colonies in order to be strong should adopt the features embodied in their Indian federation.

Their environment had many of the elements that make for superior cultural development: namely, protection, yet freedom of intercourse; rich soils, yet not so productive that exertion was unnecessary; and an "off-season," making foresight essential to racial and individual survival. Moreover, they lived in an environment possessing the climatic factors that tend

¹ H. R. Schoolcraft: *Information Respecting the History, Condition, and Prospects of the Indian Tribes of the United States*, 6 vols., Philadelphia, 1860; reference in Vol. 6, p. 34.

to develop men having the maximum of physical and mental vigor, active of purpose, and resolute of will.

As a result of their proximity to the Hudson River, they obtained firearms from the Dutch at Fort Orange at an early date² and by 1643 had over four hundred guns.³

Possessed of all these advantages, geographic, economic, political, and military, they extended their power in every direction.⁴ They subdued the Delawares, destroyed the Eries,⁵ sent war parties far south to the Cherokee country,⁶ fell upon the Illinois tribes,⁷ scattered the Ottawa and Hurons in all directions, destroyed the Neutrals, and appeared before the very gates of Quebec itself.⁸ The Jesuit Relations⁹ for many years contain records of the ravages and murders perpetrated upon the infant French colony by these Romans of the savage world.¹⁰

The Iroquoian Confederacy retained its hold upon the land in New York until after the American Revolution, when the Mohawk, Cayuga, and other tribes, who had joined the English in the war, were settled by that nation on lands in Canada. Of all the Indian tribes they suffered least by the encroachment of the whites, because of their superior economic development and firm hold upon the land.

THE HURONS

In 1615 Champlain and the Jesuit Le Caron found 16,000 Huron Indians near Lake Simcoe on the fertile Ontario Lowland, whither it is believed they had been driven from the lower St. Lawrence by their brethren, the Iroquois of New York.¹¹ Like the Iroquois they were leading, for the most part, sedentary lives. Their country, called Huronia by the French, was described by the Jesuits as having a fine situation. There are plains, says the report, "surrounded and intersected by a number of very beautiful lakes or rather seas."¹² Another writes: "As for the Huron country, it is tolerably level, with many prairies, many lakes, many villages Their

² The Jesuit Relations and Allied Documents: Travels and Explorations of the Jesuit Missionaries in New France, 1610-1791, R. G. Thwaites, edit., 73 vols., Cleveland, 1896-1901; reference in Vol. 34, p. 133. See also *New York Hist. Soc. Colls.* for 1869, p. 3.

³ Handbook of American Indians North of Mexico, 2 parts, F. W. Hodge, edit., *Bur. of Amer. Ethnology Bull.* 30, Smithsonian Institution, Washington, D. C., 1907, 1910; reference in Part I, p. 588.

⁴ S. D. Peet: The Delaware Indians in Ohio, *Amer. Antiquarian*, Chicago, Vol. 2, 1879-80, pp. 132-144; reference on p. 134.

⁵ Schoolcraft: Indian Tribes, Vol. 6, p. 35.

⁶ James Mooney: Myths of the Cherokee, *19th Ann. Rept. Bur. of Amer. Ethnology*, 1897-98, Washington, D. C., pp. 11-548; reference on p. 351.

⁷ Documents Relative to the Colonial History of the State of New York, 14 vols., Albany, 1856-83; reference in Vol. 9, pp. 147, 162.

⁸ Jesuit Relations, Vol. 5, p. 290; Vol. 12, p. 199.

⁹ Vol. 12, p. 199; Vol. 22, p. 43; Vol. 26, p. 33; Vol. 30, p. 161; Vol. 40, p. 211; Vol. 45, pp. 185, 189.

¹⁰ The idea of "superman," much proclaimed by a certain European nation of the modern period, is apparently not new. Cadwallader Colden says of the Iroquois: "The Five Nations think themselves by nature superior to the rest of mankind and call themselves *Ongue-honwe*, that is, men surpassing all others. This opinion, which they take care to cultivate and instil into their children, gives them that courage which has been so terrible to all the nations of North America; and they have taken such care to impress the same opinion of their people on all their neighbors, that they, on all occasions, yield the most submissive obedience to them" (Schoolcraft: Indian Tribes, Vol. 3, p. 185).

¹¹ Jesuit Relations, Vol. 1, p. 22.

¹² *Ibid.*, Vol. 8, p. 115.

cabins are made of large sheets of bark in the shape of an arbor, long, wide, and high in proportion; some of them are seventy feet long The land, as they do not cultivate [plough] it, produces for only ten or twelve years at most; and when the ten years have expired, they are obliged to remove their village to another place."¹³ The Hurons practiced migratory agriculture, common among primitive peoples, a forerunner of true agriculture. Their position on the Trent River outlet, with rivers and lakes leading to Georgian Bay and southward to Lake Ontario, gave them advantages for traffic with other tribes. They were keen traders and made annual trips to the lower St. Lawrence by way of Georgian Bay and the Ottawa River, carrying with them their own furs and those of other tribes, especially those of the Neutral nation to the south.

THE OTTAWA

The main home of the Ottawa Indians during the early part of the seventeenth century was on Manitoulin Island and the eastern shore of Georgian Bay.¹⁴ For the most part, their habitat was not as productive as that of the Iroquoian or Huron Indians. Glaciation of the resistant limestones (Niagara) of the northern part of Manitoulin Island and of the crystallines of the oldland bordering Georgian Bay resulted in much bare rock. It is only in pockets that soil can be found suitable for cultivation. But geographic conditions favored freedom of intercourse for the Ottawa. Manitoulin Island is surrounded by bays, and the eastern shore of Georgian Bay is festooned by small islands and cut by fiordlike indentations. Such coast lines bordered by thin soils have been the chief factors in producing the sea rovers and fishermen of Norway and the Canoe Indians of the northwestern coast of America.¹⁵ Though the Ottawa Indians lacked the large, easily worked timber that make the beautiful, seaworthy canoes of the Haida Indians possible, they constructed canoes of birch bark, sufficiently large and serviceable to carry them along the rivers and the borders of the larger lakes. The Ottawa were not sufficiently advanced in mechanical arts to construct the serviceable vessels that the Norsemen built, but the carrying agent which they and other tribes of the "birch region" did evolve is the only one that time has shown to be serviceable in a region where frequent portaging is necessary.

Their geographic position on the borders of the lakes gave them great opportunity for trading with the other Indian nations. Segard says they traded with other tribes as far west as the Baie des Puants (Green Bay).¹⁶ Other reports show that they went even farther, from 400 to 500 leagues from their homes.¹⁷ They bartered in corn meal, sunflower oil, furs, skins, rugs, mats, tobacco, roots, and herbs; and their position at the western

¹³ Jesuit Relations, Vol. 15, p. 153.

¹⁴ *Ibid.*, Vol. 14, p. 286; Vol. 18, p. 231.

¹⁵ W. H. Collison: *In the Wake of the War Canoe*, New York, 1916; reference on p. 89.

¹⁶ Jesuit Relations, Vol. 15, p. 248.

¹⁷ Handbook of American Indians, Part II, p. 168.

entrance of the Ottawa trade route gave them easy access to the markets at Montreal. The Ottawa were the first of the Lake Indians to trade with the French and, since many of the Indians on the western prairie were not accustomed to the use of the canoe, acted as middlemen between them and the French on the lower St. Lawrence.

THE CHIPPEWA

All during the historic period, even down to the present time, bands of Chippewa Indians have lived at or near the falls of the St. Mary's River and in the region to the south of Lake Superior. Much of the soil of their territory is entirely unsuited to tillage. It is a land of long, cold winters and short growing seasons, of thin soils, and numerous swamps and lakes. The isolation of the area from the main lines of westward expansion of the whites and its adverse geographic conditions just enumerated served to retard its settlement. This slow settlement and the wild condition of much of the area have made it, even down to the present, a haven for the Indian. Indian economy had little use for the mineral deposits. The leanness of the land made game and fish the principal food of the natives. All through the historic period, the Chippewa in the region about Lake Superior has been a fisherman, and, since fish¹⁸ has been his chief source of food, he employs many devices for procuring them.¹⁹

The Chippewa, like the Ottawa, had commercial aptitudes and acted as middlemen between the "far" Indians and the French.

Between 1665 and 1671 the Chippewa Indians obtained firearms from the French and were enabled to press the Fox and Dakota Indians to the west and south. In their westward expansion they seemed to be actuated by a desire to reach the rice fields of northern Wisconsin and eastern Minnesota.

WILD RICE INDIANS

The wild rice region was mainly north of a line extending east and west of Lake Winnebago, with a southern projection along the Fox and Wisconsin Rivers. In this region besides the Chippewa there were at times

¹⁸ Jesuit Relations, Vol. 50, p. 297; Vol. 54, p. 149; Vol. 55, p. 101. See also H. R. Schoolcraft: Summary Narrative of an Exploratory Expedition to the Sources of the Mississippi River, Philadelphia, 1855, p. 95; and Jonathan Carver: Travels Through the Interior Parts of North America in the Years 1766, 1767, and 1768, London, 1778, p. 142.

¹⁹ Father Allouez describes Chippewa fishing in the rapids of St. Mary's River in 1669 as follows: "It is at the foot of these rapids, and even amid these boiling waters, that extensive fishing is carried on, from spring until winter, of a kind of fish found usually only in Lake Superior and Lake Huron. It is called in the native language *Atticameg*, and in ours 'whitefish' Dexterity and strength are needed for this kind of fishing; for one must stand upright in a bark canoe and there amid the whirlpools, with muscles tense, thrust deep into the water a rod at the end of which is fastened a net made in the form of a pocket, . . . six or seven large fish being taken each time until a load of them is obtained" (Jesuit Relations, Vol. 54, pp. 129, 131). Jonathan Carver, who visited the Sault about 1766, describes the fisheries there in a similar vein. He says that fish were in such great numbers at the bottom of the falls that enough might be taken "to supply, when properly cured, thousands of inhabitants throughout the year" (Carver, Travels, p. 142). One of the interesting sights at the Sault today at certain seasons is the Chippewa Indians in their canoes in the "boiling water" plying their nets as did their forefathers two and a half centuries ago.

the Menominee,²⁰ Miami, Potawatomi, Winnebago, Sauk, Fox, Kickapoo, and Mascoutens.²¹ According to many writers, the early explorers considered the wild rice region a veritable paradise.²²

In this region were many kinds of game, wild fowl fed on the wild rice in great numbers, and the lakes and rivers abounded in fish. The fertile soil produced wild grapes, plums, and other fruits and when tilled gave abundant crops of corn, beans, pumpkins, squash, and watermelons. But doubtless the crowning attraction was the wild rice marshes, "offering an abundant harvest without any labor save that of gathering it."²³ Jenks says that for about two hundred years 10,000 Ojibwas (Chippewas) had access to the wild rice fields. Prairie Lake, a small body of water in Barron County, Wisconsin, with a shore line of about ten miles, could alone furnish grain enough to supply a body of 2,000 Indians.²⁴ The population of this wild rice region undoubtedly equaled in numbers that in all the other parts of the country known as the Northwest Territory, although the area is but one-fifth that of the whole.²⁵

The wild rice Indians were on the whole non-migratory, but they were not as advanced in their cultural development as were the Iroquois.²⁶

INDIANS OF THE LAKE PLAINS AND RIVER VALLEYS BETWEEN LAKES ERIE AND MICHIGAN

On the lacustrine and glacial plains lying between Lakes Erie and Michigan and to the south, a region which is now one of the most populous and progressive agricultural sections of America, there were several tribes of Indians, all apparently in comfortable circumstances until disturbed by the white traders and settlers. The Potawatomi in the early part of the eighteenth century were scattered over a good part of southern Michigan but were particularly numerous along the St. Joseph River, where many

²⁰ Jesuit Relations, Vol. 44, p. 324; Vol. 55, pp. 103, 185; W. J. Hoffman: The Menomini Indians, *14th Ann. Rept. Bur. of Amer. Ethnology*, 1892-93, pp. 3-328, Washington, D. C.; reference on p. 12.

²¹ Jesuit Relations, Vol. 44, p. 247; Vol. 68, p. 330; A. E. Jenks: The Wild Rice Gatherers of the Upper Lakes, *19th Ann. Rept. Bur. of Amer. Ethnology*, 1897-98, pp. 1013-1137, Washington, D. C.; see especially pp. 1038-1055; J. G. Shea: The Indian Tribes of Wisconsin, *3d Ann. Rept. and Coll. of the State Hist. Soc. of Wisconsin*, Madison, 1857, pp. 125-138; references on pp. 129 and 133.

²² Heberd (quoted by Jenks, *19th Ann. Rept. Bur. of Amer. Ethnology*, p. 1111) says: "The land was exceptionally rich in all essentials of barbaric plenty." Charlevoix reported it the "most charming country in all the world" (*ibid.*, p. 1112). The Jesuit Relations for 1671 describes the Fox River country as "the fairest land possible to behold—in every direction, prairies only, as far as the eye can reach, cut by a river which gently winds through it, and on which it rests the traveler to paddle his canoe. The region of forests and mountains is passed when one arrives here . . . Hence these people know not what it is to travel by water and have no other houses, for the most part, than such as are made of rushes woven together in the form of mats . . . The banks of this river, which flows gently through the midst of these prairies, are covered throughout with a certain plant bearing what is called here wild oats, of which the birds are wonderfully fond" (Jesuit Relations, Vol. 55, pp. 193, 195).

²³ Jenks, *19th Ann. Rept. Bur. of Amer. Ethnology*, p. 112.

²⁴ *Ibid.*, p. 1042.

²⁵ *Ibid.*, pp. 1106, 1110.

²⁶ Jesuit Relations, Vol. 44, p. 247; Vol. 54, pp. 14, 15; Vol. 62, p. 193; D. B. Warden: A Statistical, Political, and Historical Account of the United States of North America, 3 vols., Edinburgh, 1819; reference in Vol. 3, p. 102.

bands had settled.²⁷ It is interesting to know that the fame of western Michigan as a fruit belt is not entirely the result of the work of white men in the modern period. A French trader who visited the region about 1718 says that here he saw "the finest vines in the world, which produce a vast quantity of very excellent grapes, both white and black, the berry very large and juicy, and the bunch very long."²⁸ Both the French and the Americans recognized the attraction of this region for the red men. The Jesuits founded a mission at the mouth of the river about 1700, another south of where Niles now stands, and the French built a fort on the St. Joseph to command the St. Joseph-Kankakee trade route. The French and Indians tilled the soil about the fort, raising the usual products of Indian agriculture, and many orchards of apples were planted. In 1820 the Cary Mission, established near the site of Niles, undertook to serve the Indians both spiritually and materially.²⁹

The Ottawa were numerous about the rapids of the Grand River, drawn there by the rich soil for the cultivation of corn, the excellent fishing at the rapids, and the abundant game in the dense forest of the valley. Although the resident population at the rapids did not number more than 500 to 600, there were at times as many as 2,000 to 3,000 encamped there. French traders visited the region frequently, and about 1806 the American Fur Company established a trading post at the mouth of the Grand River.³⁰

Hurons, Ottawa (in Canada), and Potawatomi were numerous about the trading post and fort at Detroit. Certain bands of the Hurons, which later came to be called Wyandot, resided along the marshy shores of Lake Erie near Sandusky. The Miami Indians were located near the portage of the Maumee and Wabash Rivers, a region which "abounded at all times, especially in the spring and fall, with game without end." In the extensive marshes that border the lower drowned portion of the Maumee River, swan, geese, ducks, and crane were so numerous that they drove "sleep away by the noise of their cries." There were many buffalo found at a place called by the French La Glaise (Defiance), drawn there by the salt licks.³¹ In 1792 General Wayne found a continuous plantation of corn along the entire length of the Maumee River (on the higher lands) from Fort Wayne to the mouth.³²

THE INDIAN'S FOREST ECONOMY

Although some of the Indian tribes of the Great Lakes region, like the Iroquois and to a lesser extent the Hurons, Miami, and the Potawatomi,

²⁷ Jesuit Relations, Vol. 66, p. 348.

²⁸ Doc. Colon. Hist. of N. Y., Vol. 9, p. 890.

²⁹ D. A. Winslow: Early History of Berrien County, *Michigan Pioneer Colls.*, Vol. 1, 1874-76, pp. 120-125; reference on p. 121.

³⁰ Albert Baxter: Some Fragments of Beginnings in the Grand River Valley, *Michigan Pioneer Colls.*, Vol. 17, 1890, pp. 325-331.

³¹ Doc. Colon. Hist. of N. Y., Vol. 9, p. 891.

³² Handbook of American Indians, Part I, p. 41.

made corn, beans, and garden truck a large part of their sustenance, they were essentially a forest people and practiced a forest economy. The influence of the forest, the rivers, the lakes, and the abundant game wooed them to the life of a hunter. Their fields were for the most part mere patches of land poorly cleared in the midst of thousands of acres of woods. They, therefore, utilized forest resources, not soil resources. They had no reason for destroying the forests, for that meant the destruction of home and sustenance. As children of the forest they utilized their environment to the fullest degree. The experiences of Europeans in a forest habitat, living the life of a hunter, show that the Indians had reached the stage of perfection in hunter life. The Anglo-Saxon in the Great Lakes region never allowed himself to be freed from European influences. His advances into the Indian environment were timorous. In most cases he kept the lines of communication open. But the Frenchman, traveling for hundreds of miles along the waterways, went boldly into the red man's world and was completely encompassed by it. Here he found he could live most easily by adopting, for the most part, the Indian's mode of life. He built birch-bark canoes, donned the leather suit, hunted and fished as the Indian did, married the daughter of some Indian chief, and lived in a bark or skin wigwam. The superior European methods of tillage with which he was familiar were not practiced. His squaw girdled the trees and planted the usual crops of Indian agriculture, cooked his food in the Indian custom, and raised his offspring in the way of her forefathers. Thus the white man living in the same environment as the Indian and utilizing the same resources sank to his level in economic, social, and, to a certain degree, intellectual life.

THE INDIAN AS FISHERMAN

In hunting and fishing, the Indian was at his best. The collecting and preserving of natural foods were left with the women, so too was the cultivation of corn; but hunting and fishing were the work of the men. They were occupations to which the males bent all their energy. Though all tribes of the Great Lakes region fished to some extent, the nomadic Indians in the regions of thin soils were forced to make fish a large part of their food and resorted to the lake shores in great numbers during the fishing season.³³ Among such people fishing became an art and was taught the young. Just how much the Indian learned from the French is difficult to determine. The Jesuits, who were among the first to visit the red man in his haunts, describe many devices in use by the red man—spears (javelins as reported by the Jesuits), torches, decoys, nets of all sizes, and mechanical structures, such as weirs, dams, sluices, and sturgeon yokes.³⁴

³³ Jesuit Relations, Vol. 55, p. 97.

³⁴ Schoolcraft: Indian Tribes, Vol. 2, p. 51; *idem*, Summary Narratives, etc., p. 95; Jesuit Relations, Vol. 35, p. 175; Vol. 43, p. 261; Vol. 54, pp. 131, 217, 306; Vol. 55, p. 159; Vol. 56, p. 121.

GREAT LAKES FISHING SITES

In the Great Lakes region there were at least three sites that were much resorted to by the red man to catch and cure fish. Michilimackinac, "the spot most noted in all the region for its abundance of fish," was visited by the Ottawa, Hurons, Chippewa, and other tribes.³⁵ Some of the tribes that resorted to the falls of the St. Mary's River came to Michilimackinac certain seasons when there was not fish at the falls. The fame of the falls of the St. Mary's River, as previously described,³⁶ was great. The red man knew the advantages of fishing at rapids, and fishing villages were found at many of them in the Great Lakes region.³⁷ Pointe St. Esprit (Ashland Bay), a third important region, drew so many Indians to its fisheries that Marquette built his mission there so that he might have the opportunity of ministering to large bodies of Indians.³⁸ Lake Superior from all accounts had the most productive fisheries of the Great Lakes. According to the Jesuit Relations, "a full list of all its fisheries would require a complete enumeration of all the coves and all the rivers."³⁹

From all accounts, therefore, the Indian exercised in fishing about as much intelligence as the white man does, employed practically all the devices the latter uses, knew the best regions for fishing, and the devices best suited for particular conditions.

THE INDIAN AS HUNTER

While the red man used fewer devices to procure the denizens of the forest than he did in fishing, hunting demanded greater dexterity and intelligence. This was fully recognized by the Indians, and the successful hunter was honored as highly as the great warrior. Winter was the chief season for hunting, the best conditions being a deep snow and particularly a snow with a thick crust. "Snows are the savages' riches," says the Jesuit Relations, "for the moose, caribous, and other animals are caught in them as in a snare, when they are deep enough."⁴⁰ So essential to the success of the hunter were the snows that, in seasons when little fell, famines were widespread and many died of hunger.⁴¹ In late spring and summer, "fire hunting" at night along streams was employed to procure deer. Many of the animals went into the valleys at night at certain seasons, and the hunters would go out at dawn to hunt them, always approaching them, when possible, from the east so as to have better vision.⁴² Co-operation was common in hunting the bear, deer, elk, caribou, and buffalo. Hunters usually united in hunting the beaver, the season extending throughout the

³⁵ Jesuit Relations, Vol. 55, pp. 101, 157, 161; Vol. 56, pp. 115, 117.

³⁶ See footnote 19.

³⁷ Jesuit Relations, Vol. 54, pp. 129, 131.

³⁸ *Ibid.*, p. 151.

³⁹ *Ibid.*, pp. 151, 153.

⁴⁰ *Ibid.*, Vol. 45, p. 61; Vol. 49, p. 159; Schoolcraft: Indian Tribes, Vol. 2, p. 54.

⁴¹ Jesuit Relations, Vol. 7, p. 145; Vol. 37, pp. 39, 147.

⁴² Schoolcraft: Indian Tribes, Vol. 2, p. 54.

whole winter, from November to April, the fur at this time being in great perfection.⁴³ Nearly all parts of the animals were utilized. Flesh, hide, horns, hoofs, and bones were used as food, clothing, shelter, in the arts or as articles of commerce.⁴⁴

Not only were the resources of fish and forest animals utilized to their fullest, but much use was made of the herbs, shrubs, and trees for food and in the Indian arts and crafts.

UNUSED RESOURCES AND THE EFFECT OF CIVILIZATION

In agriculture the Indian made little advance and, therefore, used only a small part of the sustaining power of the land. He lacked draft animals to make his "garden" agriculture true agriculture and he lacked the tools to make it as productive as the modern garden type. The land that he held, but only here and there attempted to cultivate in a superficial way, supported a vast amount of vegetation that could not be used directly or indirectly by him and in addition supplied food to a large number of animals that in no way contributed to his sustenance. It is only from the standpoint of the agriculturist, the lumberman, the mine operator, or manufacturer, however, that the Indian can be said to have made a superficial use of his resources. As long as the forests preserved their natural resources and these resources sufficed to meet his demands, there was no reason for his changing his relations to his environment. But depletion of resources or increase of population would hardly have forced him, unaided in his natural environment, to cultural advancement, for he lacked the essentials of true agriculture. Civilization brought cultural retrogression. The fur trade led him to overexploit the animal resources of his environment, to abandon most of the advances he had made in native arts and primitive agriculture, and to depend on the whites for the necessities of life. No longer able to support himself from the resources of the forest, unable to advance, even with the now easily obtainable essentials for true agriculture, owing to his economic retrogression, he could do nothing better than cede his lands and move to the West, where he could still live his old life.

⁴³ Jesuit Relations, Vol. 3, p. 79; Vol. 5, p. 61; Vol. 6, pp. 297-303.

⁴⁴ *Ibid.*, Vol. 1, pp. 249, 263, 281; Vol. 4, p. 267; Vol. 9, p. 273; Vol. 10, p. 283; Vol. 13, pp. 39, 101; Vol. 15, p. 155; Vol. 24, pp. 171, 173.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Monthly Meeting of November. The first regular monthly meeting of the American Geographical Society was held on Tuesday evening, November 19, at the Engineering Societies' Building, 29 West Thirty-ninth Street. President Greenough presided. He submitted for confirmation the names of 293 candidates for Fellowship, each of whom had been approved by the Council, and they were confirmed as Fellows of the Society. Thereupon Professor Bailey Willis of Leland Stanford Junior University, California, addressed the Society on "The Physical Basis of National Development." The address dealt with the development of nations as conditioned by the physical nature of their domain. Many examples, both from the Old World and the New, were cited to support the thesis. Particular attention was given to the topic from the point of view of peace problems.

NORTH AMERICA

The Minnesota Forest Fire of October 12-15, 1918. One of the most disastrous forest fires in the history of the country raged in northeastern Minnesota during October 12 and 13, 1918, and continued in secondary waves throughout the two following days. Fires originated in numerous places within an area of about 15,000 square miles, an area larger than that of Belgium by 4,000 square miles. From 1,200 to 1,500 people perished, and hundreds more were wounded. Although the entire region was not devastated, it seems that few square miles of the timbered portions were untouched. In some townships every farm was completely wiped out.

Cloquet, a city of 7,500 inhabitants, headquarters for one of the largest white pine lumber companies in the United States, was wiped out with the exception of a few industries along the St. Louis River. Many smaller towns and settlements were completely destroyed. The outskirts of the "East End" of Duluth were severely damaged, about three hundred houses having burned. Those who were members of the American Geographical Society's Transcontinental Excursion of 1912 will recall the attractive Northland Country Club, where they were entertained at luncheon. The main house and the beautiful evergreen-birch woods for miles around are now things of the past. Two large lumber companies on St. Louis Bay, opposite the heart of the city, were destroyed as well as the approaches to the Interstate Bridge connecting Duluth and Superior in Wisconsin.

There are those who point to incendiarism as the cause of the fire, although small fires had been burning here and there for several days. The frequency of brush fires during the Fall season has developed a certain amount of indifference toward them in spite of the fact that all that is needed to make them serious at any time is a strong wind from the right direction. The conditions this year were highly propitious for the rapid spread of the fires. The territory experienced the driest season in the history of the local Weather Bureau. The secondary rain maximum, which occurs regularly in September (the primary occurs in June), failed to set in and was preceded by an exceptionally dry summer, thereby causing an unprecedented dryness of underbrush and timber. A wind reaching about 40 miles an hour during the afternoon of October 12 fanned the flames into sheets of fire. At 5 P. M. the wind suddenly rose to 60 miles an hour, "falling again to about 40 miles after 9 P. M." This sudden rise in velocity was undoubtedly due to the local reduction in pressure established by the overheating of the atmosphere, as a consequence of the fiercely burning pitch in the dry pine, spruce, and tamarack woods. The circulation of air locally took on a cyclonic character, although under the general control of an anticyclone at the time. The fires were intensified and their devastating powers increased many fold. The maximum damage was done at this time. Winds of such high velocity occurred nowhere else in the rest of the state nor the surrounding states, nor did the barometric gradients on the weather map of that morning give any indication of possible high winds. With the subsidence of the local "whirl" the wind moderated and turned to the northeast, saving Duluth, Two Harbors, and probably Superior, important shipping points for most of the iron ore being utilized in the manufacture of munitions and steel products.

The fire having in the main exhausted itself after about five days of intermittent fierce and moderate blazing, rooted itself in the extensive peat swamps (muskeg). This

is an added serious loss, for these swamps burn slowly and deeply, after which their fertility is considerably reduced, excepting for the first year or two immediately after the burning. Subsequently heavy fertilizer will be necessary, making crop cultivation expensive.

While the tremendous losses in human lives and material property are most lamentable and can never be recovered, such a catastrophe is not without its ray of hope. The present settlers are pioneers. Their struggle has been one of continued sacrifices, leading a way for those who will eventually reap the profitable harvests. The clearing of the land has presented the greatest obstacle, especially because of the dense under-



FIG. 1—Sketch map showing area devastated in Minnesota forest fire of Oct. 12-15, 1918. 1:2,460,000.

brush. No people have ever fought more valiantly against the adversities in Nature's domains than the Scandinavians and Finns of northeastern Minnesota. And now the small fruits of their fifteen or twenty years' struggle have been taken from them. Yet, they will return to start the work over again. The fires will have aided them in the further clearing of the land, and for this some thanks may be offered. The hardships of the future will be mitigated somewhat. Next year the beautiful fireweed with its nectar-filled pink blossoms will rise as if by magic and supply the honey bees with rich sweets. Those who are wise enough to engage in bee-keeping will earn a large reward. Then too, the unexcelled, pink and white, wild clover will come in slowly, returning in strength within two or three years, to give the newly purchased milch cows the nourishment which makes them profitable. Sheep will have enough to nibble on at the outset, and even hogs may thrive. The region is destined to be a dairy and sheep land, and the time when it will come into its full fruitage will soon be at hand in spite of and even with the help of the depressing fires.

EUGENE VAN CLEEF

A Recent Dust Fall and Its Origin. In the *American Journal of Science* for October, 1918 (pp. 599-609), there appears the account of a dust fall in which unusually favorable opportunities were offered and taken advantage of for the study of what is a rather common but little understood occurrence. Thanks to the promptness and care exercised by the observers, Messrs. A. N. Winchell and E. R. Miller, at Madison, Wis., we have what seems to be an excellent record of this dust fall, not only as to the nature of the material deposited and the area covered, with an estimate of the total amount precipitated, but, more important still, as to the course probably followed by the dust particles and a plausible hypothesis concerning the source and circumstances of its origin.

Dust was noted in the moist snow and sleet which fell on March 9, 1918, in Iowa, Wisconsin, Upper and Lower Michigan, and as far east as Vermont, covering an area of at least 100,000 square miles. The observers calculated that not less than a million tons of organic and inorganic material fell, and probably many times that amount. The particles consisted chiefly of feldspar, quartz, opal, limonite, and other inorganic matter, but there were also bits of plant tissue.

Search for the origin of the dust was facilitated by the facts that a snow cover lay over the country to the north and that rain had fallen in many localities during preceding days. A map shows the areas thus eliminated as probable sources. A well-defined cyclonic disturbance was moving across the continent, having entered northern California on March 7. This led to an investigation of meteorological conditions in the arid regions of the Southwest, particularly in New Mexico and Arizona, where are located large areas of siliceous feldspathic rock. It was learned that strong convectional currents had prevailed there on March 5, raising dust storms so severe as to cause much discomfort at the military camps. From a study of air currents as given by the Weather Bureau the investigators conclude that an enormous quantity of dust must have been eroded from these arid regions, lifted into the upper atmosphere, and carried with the storm a thousand miles or more to the northeast, where it was brought down by the snow and sleet which had formed at a great altitude in the air.

Length of the Growing Season in Kentucky. The dates of the last killing frost in spring, of the first killing frost in autumn, and of the length of the growing season in Kentucky have been studied by Professor F. J. Walz of the U. S. Weather Bureau Office at Louisville, Ky. (*Monthly Weather Rev.*, Vol. 45, 1917, pp. 348-353). The records of the regular stations of the Weather Bureau and those of co-operative stations with twenty years or more of record have been examined and analyzed; and mathematical methods used in the investigation of statistics and probabilities have been employed. The average dates of first and last killing frost, the average number of days in the growing season, and the standard deviations from these averages have been computed for each station, and the consequent risks or probabilities determined. This study is one of the rapidly increasing series of similar investigations into the meteorological risks with which our farmers are every year confronted. Every such discussion makes scientific agriculture more of a reality.

R. DEC. WARD

EUROPE

Regional Consciousness and Nationality in Western Europe. In a posthumous article, "Regional Environment, Heredity, and Consciousness" (*Geogr. Teacher*, Vol. 8, 1915-16, pp. 147-153), Professor Herbertson stated his belief in the fundamental nature of geography: "For the understanding of history, or economics, or politics, or any study of mankind, it is necessary (i) to realize that the wholes which are greater than the individual are geographical, (ii) to grasp the idea of a region and the need for a feeling of regional consciousness." And regarding regional consciousness Herbertson goes on to say: "There is a *genius loci* as well as a *Zeitgeist*—a spirit of a place as well as of a time. . . . The spirit of a place changes with the spirit of the time; it alters with man's relation to the region; . . . the geographer has to consider both in trying to understand the present regional consciousness." Here we find the keynote to a recent admirable work by Dr. H. J. Fleure, a follower and exponent of the school of regional geography to which Herbertson contributed so greatly (*Human Geography in Western Europe: A Study in Appreciation*, in series "The Making of the Future," edited by Patrick Geddes and Victor Branford, Williams and Norgate, London, 1918). In the preface Dr. Fleure defines his object as "an attempt to appreciate the *genius loci* of some of the human groups which have become accustomed to live and act as such in Western Europe." To throw light from a new angle on that part of the world geographically most complex—the lands dealt with are those of the Romance and German languages in Western Europe—must necessarily be, as the author himself recognizes, tentative and suggestive—but the suggestions are many and fruitful.

Starting with the concept that man is not the mere creature of circumstance but in the possession of a certain power to mold his environment and thus shape his own destiny, the Human Zones and Regions are worked out according to their response to man's endeavor. (A broad world classification on this basis is made by the same author in the article "Régions humaines," *Annales de Géogr.*, Vol. 26, 1917, pp. 161-174.) Thus, following an outline of the three great structural, climatic, and ethnic zones of Western Europe, we are presented with a brief description of the Zone of Difficulty of the high-land core, where the land has "to a large extent refused sensible increment, even to hard and prolonged effort"; the Zone of Increment of the Mediterranean Basin, where a

favoring climate and other advantageous circumstances yielded an early response and a moderate and steady return to man's labor; the Zone of Effort, the northern slopes from the highland belt, originally densely forested, only yielding slowly to permanent human settlement. The zones, however, are not areas of definite boundary; they are transitional in both time and space. Emphasis is laid on their transitional character—a point of supreme importance in any study that involves treatment of frontiers. Troubles have repeatedly arisen from the failure to appreciate the existence of transitional regions: Germany's attempt to force Lorraine violently from its historic intermediate position is a case in point. Furthermore the transitional region, because it is characteristically a meeting place of men and their products, has unique possibilities for the acquisition of wealth, material and spiritual. France, where the mountain zone dies down and northern and southern belts meet, is a transition region on a great scale. Races and influences have here met and mingled to a remarkable degree, and it is here that we may find "the best answer to theories of the super-man and the super-race." On the contrary it is the tragedy of Germany that her traditionally rich and cultured transition zone of the southern valleys should have been dominated by the *nouveau-riche* North German Plain.

Analysis of the zones and regions is followed by a series of "short sketches of the interweaving of relations between man and his environment" in the human groups into which they fall. The sketch of the wonderful rich and varied weavings that have gone to make the fair fabric of France was published in the *Scottish Geographical Magazine*, for November, 1916, under the title "France: A Regional Interpretation" (abstracted in the *Geogr. Rev.*, Vol. 3, 1917, p. 150). A part of the chapter "From the Alps to the Northern Seas" was treated in a previous article entitled "Berlin and Its Region" (abstracted in the *Geogr. Rev.*, Vol. 3, 1917, pp. 399-401). The Iberian peninsula and Italy also have chapters to themselves, and there is one on "The Small Peoples." Independence of the small peoples is defended on the ground of the valuable and distinctive contributions that they have made to civilization. Consideration of these small units, Denmark, Holland, Flanders, Wallonia, Luxemburg, Lorraine, Alsace, Switzerland, and Bohemia, that together (with Poland) wind round Germany, leads to the much propounded question of what constitutes a nation. Here is no definition, for no absolute criterion can be found, but there is a very interesting statement of favorable factors. "If a moderate-sized group has a common language with a rich spiritual tradition gathering round it, that group will always strive to keep its individuality." It is noteworthy too that racial unity in detail is regarded as a possible weakness: rather is it an advantage for a nation to include "a rich and intimate mixture of races for its own spiritual strength, and also, be it added, in order to promote mutual understanding with its neighbors." Such mixtures, however, as in the case of France and Britain, are the fortunate happenings of the past.

The last chapter in the book concerns Great Britain, and the final thought is of Britain as a link between the Old and New Worlds, "in co-operation with the European continent behind us and the immense human opportunities of the Americas in front."

Recent Oceanographic Investigations in Spanish Waters. Though conditions during the past few years have seriously interrupted plans made by the International Oceanographic Commission created in 1914 by the countries of southern Europe, Spain has continued her part of the enterprise in so far as the circumstances permitted. Brief accounts of this work have appeared from time to time in the *Revista de Geografía Colonial y Mercantil*, published by the Royal Geographical Society of Madrid (Vol. 12, 1915, pp. 199-200; Vol. 13, 1916, pp. 81-121; Vol. 14, 1917, pp. 361-371; Vol. 15, 1918, pp. 248-251).

Explorations were initiated by the Instituto Español de Oceanografía in the *Vasco Nuñez de Balboa*, which carried on investigations along the Mediterranean shores of Spain and in the environs of the Balearic Islands. A year later work was begun on the northern coast. In 1917 operations were limited to the waters of the Ría de Vigo. The summer of 1918 was devoted to study of the coast from Santander to the Miño (Minho), the northern boundary stream between Spain and Portugal. Here a small gunboat, the *Hernán Cortés*, was employed in the explorations. This series of studies has brought under examination sharply contrasted regions, the calm, warm, almost tideless waters of the Mediterranean, with a scanty rainfall on its coasts, and the tempestuous ria coast of the northwest, where strong tides, heavy precipitation, and the consequent erosion of wave and stream produce conditions strikingly different.

Particular attention has been given to the economic phase of the study, with a hope of being able to augment the gradually diminishing food supply obtained from the Spanish fisheries. In this work, carried on by the Instituto Español de Oceanografía

under the direction of Señor Odón de Buen, the government has lent its encouragement and active support.

When more settled conditions are established it is to be hoped that the nations about the Mediterranean will resume their co-operative efforts and accomplish there what the countries of northern Europe have done in the International Commission for the Scientific Investigation of the North Sea. With the aid of the celebrated Oceanographical Museum of Monaco, the Institut Océanographique at Paris, and the efficient Regio Comitato Talassografico Italiano, created in 1910 (on whose activities consult Giovanni Magrini: *The Objects and Work of the Royal Italian Oceanographic Committee*, 118 pp., *Memorial* [i. e. *Memoir*] 21, Venice, 1916; and L. Joubin: *Le Comité Thalassographique Italien et la station de Messine*, *Annales de Géogr.*, March, 1918, pp. 81-91) valuable contributions to our knowledge of the Mediterranean may be expected.

Weather Controls in the War. Present-day warfare emphasizes the relation between meteorological conditions and human activities. The employment of great masses of men in co-ordinated operations out of doors reveals how important are weather controls upon their movements. The weather then ceases to be considered simply as a question of relative comfort. It becomes of vital significance. The extensive use of gas as a weapon and the great development of air fighting have added new aspects to the dependence upon the condition of the elements. Meteorology has become an essential branch of military science.

Professor R. DeC. Ward, in the series of articles listed below, presents data collected from reports, official and unofficial, during the whole course of the war, and upon most of the battle fronts, showing how weather has affected the outcome of engagements. Rain, snow, ice, frosts, floods, wind direction and velocity, drought, temperature, fog, cloud, thunder squalls, sand storms, humidity of the atmosphere, even mirage are shown to have played a part in the war.

This fact being recognized, each side employed a large corps of meteorologists upon whose forecasts the armies and navies depended for their operations. Germany, cut off from the possibility of using observations taken in other lands, is said to have utilized her submarines as weather stations upon whose reports, sent in by wireless messages, forecasts were based.

Not only the weather from day to day became a matter of study, but the more general climatic conditions as well. A knowledge of the climatology of Palestine, Mesopotamia, Siberia, the Murman coast, or of the German colonies in Africa and the Pacific was recognized as necessary in the preparation for campaigns in those sections.

The value of this series of papers is enhanced by the fact that they offer, we believe, the first thorough treatment of the subject of weather controls as observed during the whole course of the war. They appear in the following journals: *Popular Science Monthly*, Vol. 85 (1914), pp. 604-613; *Journ. of Geogr.*, Vol. 13 (Feb. 1915), pp. 169-171; (March 1915), pp. 209-216; Vol. 14 (Nov. 1915), pp. 71-76; (June 1916), pp. 373-384; Vol. 15 (Nov. 1916), pp. 79-86; (April 1917), pp. 245-251; Vol. 16 (Oct. 1917), pp. 47-51; (Nov. 1917), pp. 86-90; (April 1918), pp. 291-300; *The Scientific Monthly*, Vol. 6 (Feb. 1918), pp. 97-105; (April 1918), pp. 289-304; Vol. 7 (July 1918), pp. 24-33; (Oct. 1918), pp. 289-298.

GEOGRAPHICAL NEWS

PERSONAL

PROFESSOR HENRY C. COWLES of the University of Chicago lectured on November 8 before the Geographic Society of Chicago on "Forests and Forest Policies in Illinois."

DR. GEORGE B. GRINNELL addressed the American Ethnological Society at the American Museum of Natural History on November 25 on "The Cheyenne as Indian Traders."

DR. STEPHEN S. VISHER, recently land classifier in the U. S. Geological Survey, as announced in the April, 1918, *Review*, has been appointed to an assistant professorship in geography at the University of Indiana dating from January 1, 1919. Dr. Visher's paper on "The Biogeography of the Northern Great Plains," in the *Review*, Vol. 2, 1916, pp. 89-115, will be recalled.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

South Atlantic States

SPRUNT, JAMES. **Chronicles of the Cape Fear River, 1660-1916.** 2nd edit. 732 pp.; maps, diagrs., index. Edwards and Broughton Printing Co., Raleigh, 1916.

This volume, as the name suggests, is a collection of historical materials: newspaper articles, unpublished papers, extracts from histories, a few documents, and personal reminiscences—all selected with care and arranged chronologically. The sections written by Mr. Sprunt, particularly those on the blockade runners, are vivid, realistic, authoritative. It is an excellent contribution to the local history of the Wilmington region and may well be taken as a model for future monographs. It contains much also that is of general interest. All phases of the life of the Cape Fear region are depicted—colonial, ante-bellum, bellum, and post-bellum; commercial, industrial, social, educational, and religious. The geography of the region receives considerable attention.

New Englanders were the first to explore the lower Cape Fear River and engage in trade with the Indians. They were so well pleased with the prospects for colonization that in 1660 or 1661 they purchased a tract of land from the Indians near the mouth. In 1663 a party of British from Barbados made a detailed examination with a view to settlement. The first settlers, New Englanders, Barbadians, and English, arrived on the Cape Fear River in 1664 and established Charlestown at the mouth of Town Creek about 20 miles from the bar. Others came until the town numbered about 600. The settlers became dissatisfied, however, and abandoned the settlement in 1667, some going to Albemarle and Virginia, others to Barbados.

Brunswick (whose ruins may now be seen on the west shore of the estuary 15 miles below Wilmington) was the next settlement, established in 1725. Although Brunswick had considerable trade, it was short-lived, and Wilmington, at the junction of the two branches of the river and easily reached from the ocean, became in 1735 the chief port on the Cape Fear River. Lands were early taken up along the alluvial bottoms of the river, and by 1734 there were plantations all along for at least 100 miles from the mouth. Bluffs from 20 to 100 feet high were much sought after for the location of colonial homes.

Commerce has always been the chief interest at Wilmington, the town being the collecting and receiving point for a large area in the basin of the river. In the early days lumber, naval stores, indigo, rice, and tobacco were the chief exports. Negroes, rum, salt, and manufactured goods came direct from Barbados and the West Indies, Liverpool, Glasgow, or New England. Subsequently there were changes; but lumber, naval stores, and cotton long remained the dominant exports. Harbor improvements date from 1822, when embankments and jetties were begun and some dredging was done.

In the Civil War, Wilmington, because its harbor had two channels to the ocean—New Inlet (a great storm in September, 1761, forced an opening into the river at this point, formerly known as the "Haul Over") and the Main Channel—was the most important port of the Confederacy for blockade runners.

A. E. PARKINS

North-Central States

LEVERETT, FRANK. **Surface geology and agricultural conditions of Michigan.** With a chapter on climate by C. F. Schneider. 223 pp.; maps, diagrs., ill., index. *Michigan Geol. and Biol. Survey Publ. 25: Geol. Ser. 21.* Lansing, 1917. 9 x 6.

This bulletin is a "combined revised manuscript of Publications 7 and 9" of the State Survey. An introductory chapter treating of the "Climatic Conditions of Michigan," not written by the author of the major part of the book, could be improved considerably both in content and clearness. The layman is left to ferret out much which otherwise might readily and authoritatively be conveyed to him by a more carefully organized presentation.

The remainder of the bulletin displays that excellence of scholarship which character-

izes the author's many contributions to geology and geography. The details of the region are probably better known to him than to any one else.

The volume is divided into two parts, treating the Northern and Southern Peninsulas respectively. In each section the physiography, the glacial features, and lake history are presented in detail. Brief agricultural notes constitute the fourth chapter in each part. One wishes that these notes were considerably elaborated, even though they are intended only as incidental. In Part I the last chapter is devoted to a brief discussion of water supply.

Maps, including two folded maps, scale 1:1,000,000, one for each peninsula, show the surface formations, and photographs add to the further illumination of the text. Definitions of terminology, whenever clearness is needed for the layman, insure to all a correct understanding of the contents.

EUGENE VAN CLEEF

PARKINS, A. E. **The historical geography of Detroit.** xix and 356 pp.; maps, diagrs., bibliogr., index. (University Series, III.) Michigan Historical Commission, Lansing, 1918. 9 x 6½.

"The plan of presentation of the material in the thesis follows that of the historian." Events in the history of Detroit have been recorded in chronological order and the geographic influences coupled with them. The volume is essentially a compilation of data.

After a few preliminary remarks in Chapter 1 on the "Geographic Setting of Detroit," the following five chapters discuss the founding of the city and its faring under the will of early explorers, subsequent British control, and later American government. Then follow a chapter which returns to the geographic setting in the form of local details, a chapter on the last century of growth, and four chapters on the relation of Detroit to the development of navigation, water transportation, land transportation, and manufactures respectively. Finally there is a chapter entitled "Factors in the Growth of Population and Development of Manufactures."

The point of view, it seems, could quite consistently have been shifted at the end from that of historian to geographer. The author would thereby have been able to present a clearer picture of the status of Detroit today as a consequence of her many years of interesting history.

The value of the work may be sought primarily in its numerous details gathered from a seemingly exhaustive research. Maps and a few diagrams and tables illuminate the text. It is regrettable that the maps lack parallels and meridians—the very foundation of all map construction. An extensive bibliography and detailed index complete the volume.

EUGENE VAN CLEEF

ALDEN, W. C. **The Quaternary geology of southeastern Wisconsin, with a chapter on the older rock formations.** Preface by T. C. Chamberlin. 356 pp.; maps, diagrs., ills., bibliogr., index. *U. S. Geol. Survey Professional Paper 106.* Washington, D. C., 1918.

BUCK, S. J. **Illinois in 1818.** xxvi and 362 pp.; maps, ills., bibliogr., index. (Illinois Centennial Publications, Introductory Volume.) Illinois Centennial Commission, Springfield, 1917. 9 x 6.

WOOD, E. O. **Historic Mackinac: The historical, picturesque, and legendary features of the Mackinac country.** Vol. 1: 697 pp.; maps, ills. Vol. 2: 773 pp.; diagr., ills., bibliogr., index. The Macmillan Co., New York, 1918. \$12.50 for 2 vols. 9 x 6.

— [Topographic map of the United States.] 1:62,500. Sheets: (1) *Kings*, (2) *Kirkland, Ill.*; (3) *Belvidere*, (4) *Rockford, Ill.-Wis.*; (5) *Battle Creek*, (6) *Galesburg*, (7) *Leonidas*, (8) *Union City, Mich.*; (9) *Brainerd, Minn.*; (10) *Bainbridge*, (11) *Camp Sherman*, (12) *Garrison*, (13) *Higginsport, O.*; (14) *New Effington, S. D.-N. D.*; (15) *White Rock, S. D.-Minn.-N. D.*; (16) *Neshkoro, Wis.* U. S. Geol. Survey, Washington, D. C., 1917, 1918. [Leonidas, Mich., sheet surveyed in co-operation with the War Department and the state of Michigan]

EUROPE

GENERAL

SCHÜTTE, GUDMUND. **Ptolemy's maps of northern Europe: A reconstruction of the prototypes.** xvi, 150, and xxxi pp.; maps, diagrs., ills., bibliogr. Royal Danish Geogr. Soc., H. Hagerup, Copenhagen, 1917. 10½ x 7.

The student of historical geography finds himself repeatedly brought into the presence of that greatest of all geographers of antiquity, Claudius Ptolemy; his work still sur-

vives to influence research within the field he so ably represented. The editions of his geography, with and without his so-called maps, which have been issued since the revival of interest in his work in the early fifteenth century, are exceedingly numerous; these, with the volumes which have been issued with critical commentaries, would make up a library of large proportions. Dr. Schütte in this monograph makes one of the latest contributions of value, it being a comparative study involving a careful consideration of the sources. He has approached his subject not from an entirely new standpoint, but he emphasizes a phase of Ptolemy studies which is certain to prove more and yet more fruitful. He had given us certain preliminary results of his researches (G. Schütte: Ptolemy's Atlas, *Scottish Geogr. Mag.*, Vol. 30, 1914, pp. 57-77; 294-297), with much attention to philological problems in Ptolemaic nomenclature. In this his latest publication he limits himself largely to cartographical problems. A question much discussed has been that relating to the real author of the so-called Ptolemy maps. "What matters," Dr. Schütte well says, "is not in the first place the cartographer's name, whether Agathodaemon or a better known author or anonymous. The main point is the time at which he lived and the cartographic standard of his age."

The author has been moved to this particular critical study of the subject, as he gives us to understand, by the necessity for a revision of the traditional ideas about classical geography within the region of his own country, Denmark. His method as applied to this region is one applicable to any other region. He attaches much importance to the Ptolemy manuscripts, of which about forty are now known, and he pays here fitting tribute to that first of modern Ptolemy students, Professor Joseph Fischer, S. J., who has brought to light some of the most important of them. While among these manuscripts there are textual differences, the author thinks with Dinse they or the great majority of them are copies of classical originals representing the Ptolemaic Atlas in pure undisturbed condition. Such confusion as appears on these maps is that due to the classical cartographers themselves. He thinks these manuscripts as we now have them can not be the work of medieval copyists, who were incapable of undertaking the enormous task of constructing a detailed atlas merely on the basis of the Ptolemy text as has often been expressed.

Dr. Schütte directs attention to Ptolemy's predecessors in the first century A. D., particularly to Marinus, of whom he, Ptolemy, gives us the only information we possess and whose maps he says he had undertaken to correct, and to the makers of itinerary charts, such as the *Tabula Peutingeriana*. The attempt is made to get at a proper reading or interpretation of geographical names as they appear on the Ptolemy maps, to find a key, as it were, for interpretation. After directing attention to what he calls the various classes of Ptolemy's errors and arbitrary arrangements, he proceeds to a reconstruction of the assumable prototypes used by Ptolemy. There then follows logically a careful synopsis of the several assumed prototypes, such as a collective map describing Europe and its environs, a map or maps giving an orographic and hydrographic description, for example, of Germania, also a synopsis of itinerary or local maps.

The greater part of the monograph indeed consists of a careful consideration of the features of the several prototypes. Several pages are given over at the conclusion of the work to a list of editions of Ptolemy's Geography, to a list of the editions of Ptolemy's Atlas and of single Ptolemaic maps, and to researches dealing with Ptolemy or based upon his statements. More than thirty plates conclude the work, in which the author has undertaken to illustrate the supposed prototypes for the several European regions, primarily Germania, concluding with a rectified Ptolemy map of nationalities and a reconstructed map of nationalities in ancient Central Europe.

E. L. STEVENSON

GIUFFRIDA-RUGGERI, V. *Antropologia e archeologia in taluni riguardi della preistoria Europea*. 31 pp. *Archiv. per l'Antropol. e la Etnol.*, Vol. 46, 1916. Mariano Ricci, Florence, 1917.

METHORST, H. W. *Mouvement de la population (Europe)*. xviii and 182 pp.; maps. *Annuaire Internatl. de Statistique* publié par l'Office Permanent de l'Institut International de Statistique. Van Stockum & Fils, The Hague, 1917. [With four graphic representations and four cartograms illustrating statistics prior to the war. Part I of the Demography, "Etat de la population (Europe)," appeared in 1916; See *Geogr. Rev.*, Vol. 4, p. 326].

MUIR, RAMSAY. *Europe and the non-European world*. *The New Europe*, Nos. 37, 38, 39, Vol. 3, 1917, pp. 321-328; 360-368; 403-408. London.

SUPAN, A. *Die europäische Halbinsel*. *Atti X Congr. Internaz. di Geogr.*, Roma, 1913, pp. 1163-1165. Reale Società Geografica, Rome, 1915. [An admirable discussion of a philosophic-geographic nature.]

TAMARO, ATTILIO. *Il trattato di Londra e le rivendicazioni nazionali*. Maps. *Boll. Reale Soc. Geogr. Italiana*, Vol. 7, 1918, No. 5-6, pp. 434-454.

— "The Literary Digest" liberty map of the western front of the great world war, showing the battle line of liberty as it stood on May 1st, 1918, also showing the lines of farthest advance of German and French offensives, with complete index. 1:500,000 or 8 miles to 1 inch. Insets: Map of the complete war area, showing Russian, Italian, Balkan, Palestine, and Mesopotamian campaigns; also the zones of submarine blockade, [1 in.: 170 miles]; the coal and iron fields in the western war territory, [1 in.: 70 miles]. Funk & Wagnalls Co., New York, 1918. [A careful compilation showing much locational detail, including main roads and, along the battle front, woods. The battle front is shown as of May 1, 1918; likewise the maximum advance of the French and the Germans. On the inset of the whole Eurasian war theater no date is given for the battle lines shown. If this is intended to be May 1, 1918, also—as seems to be the case—account should have been taken of the withdrawal of Rumania. On both the main map and this inset distinction is made by tints between the Entente and Teutonic Allies and neutral countries, and the enemy territory occupied by both belligerents. A second helpful inset shows the coal and iron fields of the western war theater.]

RUSSIA

BROUNOW, P. *Schematische Karten der Wahrscheinlichkeit des Auftretens der trockenen Dekaden*. (Landwirtschaftlich-Meteorologische Atlanten, Part I.) 8 pp. of text and 21 maps. Meteorologisches Bureau des wissenschaftlichen Comités des Ministeriums für Landwirtschaft. Petrograd, 1913. [In Russian.]

This series of excellent maps illustrates an important tendency in modern meteorology. It shows the probability of the occurrence of ten consecutive days with practically no rainfall. For each decade of days from April to October a colored map based on 369 stations in European Russia south of the 60th parallel shows during what percentage of years the ten days in question may be expected to be dry.

In April periods of ten or more dry days are infrequent in western Russia and the Caucasus but increase in frequency toward the east and north. During the next month or two the tendency toward drought diminishes. Only around the Caspian Sea and from the Caspian to the Urals is it at all marked. By the middle of May the chances of a ten days' drought in most of Russia are less than 30 per cent, while by the middle of June conditions are still better. From that time onward the probability of drought once more increases in the south of Russia but not in the north nor in the Caucasus. By the middle of September the probability that a given ten days will be dry rises to over 70 per cent in most of southern Russia, except the Caucasus. The charts represent an effort to reach the same end which Mr. W. G. Reed has recently achieved by a still better method in his studies of weather probabilities in the *Review* (W. G. Reed and H. R. Tolley: *Weather as a Business Risk in Farming*, *Geogr. Rev.*, Vol. 2, 1916, pp. 48-53).

ELLSWORTH HUNTINGTON

BLANC, ÉDOUARD. *Le futur réseau des voies navigables de l'Empire russe*. *Ann. de Géogr.*, No. 140, Vol. 26, 1917, pp. 106-137.

KHVOROSMANSKI, P. *The Orenburg grain market*. 28 pp.; diags. Annex to Part 25 of *Reports of the Orenburg Section*, Imperial Russian Geographical Society. [In Russian.]

MARR, N. J. *Sur la migration des peuples japhétiques du sud au nord du Caucase*. *Bull. Acad. Imp. des Sci. [de Pétrograd]*, Ser. 6, 1916, No. 15, pp. 1379-1408. [In Russian.]

MOROSOFF (POPOFF), E. *Le lac du Petit Ritza*. Ills. *Recueil publié à l'occasion du vingt-cinquième anniversaire du Club Alpin de Crimée et du Caucase*, pp. 167-171. Odessa, 1915. [In Russian.]

PANKIEWICZ, IWAN. *Die Weissrussen*. Map, bibliogr. *österreichische Monatsschr. für den Orient*, Vol. 41, 1915, No. 9-12, pp. 267-270. Vienna.

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— *Baltischen Provinzen, Die, Liv-, Est-, und Kurland. Mit vergleichenden statistischen Angaben über Grösse, Bevölkerung, und Wirtschaft.* 1:650,000. Herausgegeben im Auftrage des Baltischen Vertrauensrates vom Verlag von F. A. Brockhaus, Leipzig, Sept., 1917. [Valuable general map on a scale sufficiently large to allow of a good deal of detail. The linguistic boundary between Esthonians and Letts is shown; it runs through the middle of Livonia but practically coincides with the boundaries of certain administrative subdivisions. The place names are exclusively in the German form.]

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SPAIN, PORTUGAL

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NAVARRO, L. F. *Le glaciariisme quaternaire dans la Péninsule ibérique*. Diagrs. *Rev. Gén. des Sci.*, Vol. 28, 1917, No. 9, pp. 263-270.

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OBERMAIER, HUGO, AND JUAN CARANDELL. *Los glaciares cuaternarios de la Sierra de Guadarrama*. 94 pp.; maps, diagrs., ill. *Trab. Museo Nacl. de Cienc. Nat., Ser. Geol. No. 19*. Madrid, 1917.

TORNER, F. M. *Llanuces: Monografía geográfica*. *Rev. de Geogr. Colon. y Mercantil*, Vol. 14, 1917, No. 7-8, pp. 250-276. Real Soc. Geogr., Madrid. [A village on the northern slopes of the Cantabrian Mountains.]

URABAYEN, L. J. *Oroz-Betelu: Monografía geográfica*. Ills., bibliogr. *Rev. de Geogr. Colon. y Mercantil*, Vol. 13, 1916, No. 8-9, pp. 289-354; No. 10, pp. 369-385; No. 11-12, pp. 409-469. Real Soc. Geogr., Madrid. [A Basque town situated in the first spurs of the Pyrenees, province of Navarre.]

VASCONCELLOS, ERNESTO DE. *Subsidios para a historia da cartografia portuguesa nos seculos XVI, XVII e XVIII*. *Bol. Soc. de Geogr. de Lisboa*, Vol. 34, 1916, No. 1-3, pp. 88-116.

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VILLAR, E. H. DEL. *Archivo geográfico de la península ibérica*. 256 pp.; maps, diagrs., ills., bibliogr. Barcelona, 1916. 10 pesetas. 10 x 7½. [A compendium of the physical relations of the peninsula (more especially Spain) based on material from many sources. These are furnished in the bibliographies given at the ends of the several sections—cartography, geomorphology, hydrography and climate, phytogeography and agriculture, zoögeography and pastoral industry.]

POLAR REGIONS

ANTARCTIC

Deutsche Südpolar-Expedition, 1901-1903, von Drygalski. Vol. 3. *Meteorologie*. Part 1: *Das Beobachtungsmaterial der internationalen meteorologischen Kooperation und seine Verwertung, nebst Erläuterungen zum meteorologischen Atlas*. By W. Meinardus and L. Mecking. *Die Luftdruckverhältnisse und ihre klimatischen Folgen in der atlantisch-pazifischen Zone südlich von 30° S. Br.* By L. Mecking. 129 pp.; diagrs. *Atlas: Meteorologie*. By W. Meinardus and L. Mecking. Part 1: *Mittlere Isobarenkarten der höheren südlichen Breiten von Oktober 1901 bis März 1904*. Parts 2, 3 and 4: *Tägliche synoptische Wetterkarten der höheren südlichen Breiten vom 1. Okt. 1901 bis 31. März 1904*. Georg Reimer, Berlin, 1911, 1915. 14 x 10½.

The remarkable increase in our knowledge of Antarctic meteorology within recent years may be roughly gauged by comparing the atlas of the German South Polar Expedition of 1901-1903, which weighs more than twenty-five pounds, with the scanty records

and correspondingly small and relatively unimportant publications on the same subject which were issued a decade or so ago. The earlier volumes dealing with the work of the German expedition under von Drygalski were reviewed in these pages (*Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 221-222) by Henryk Arctowski, who included in his notice the first part of the atlas. We now have the second, third, and fourth parts of the Atlas, a stupendous and almost appalling mass of data, but worthy of the careful attention of all students of Antarctic conditions. Those who have for a good many years past been trying to teach their classes what was known about the Antarctic, with the "patchy" and unsatisfactory information which was all that was available ten or fifteen years ago, will have, in this elaborate series of maps, a new and inspiring mass of material to draw upon.

The meteorological atlas contains the isobaric charts and the daily synoptic weather maps based on the material collected through international co-operative efforts, including the contribution made by the German expedition. The work has been done by W. Meinardus and L. Mecking. The results cover the period October 1, 1901-March 31, 1904. The discussion was published in an earlier volume, which has already been reviewed by Arctowski (*vide supra*). The volumes here dealt with are altogether cartographic. Some idea of the extent of the material here available and of the enormous amount of labor involved in its preparation may be obtained from a realization of the fact that there are, in all, nearly 1,000 charts.

The second part of the Atlas (1915) contains the daily weather maps (306 in number) for October 1, 1901, to August 2, 1902; the third part covers August 3, 1902, to June 10, 1903 (312 maps); the fourth part completes the series, up to March 31, 1904 (295 maps). It is obviously quite impossible to discuss adequately the facts here set forth. Those who merely turn over the pages of these massive volumes must inevitably be impressed by the amount and value of the material here available for study. Those who make a closer examination will gain two distinct impressions. The first is that the advance in our knowledge of Antarctic meteorology has come by a series of the most extraordinary leaps and bounds. The second is that these charts, valuable as they are, and vastly important as they are, are still so strikingly incomplete—so dissatisfyingly incomplete, not through any fault of the compilers, but because there is still so very much that we want to know. The mere handling and cursory examination of these volumes is a real pleasure, and a real education in itself. Only those who have the time to study them closely can appreciate what a splendid contribution has here been made to meteorological science.

R. DEC. WARD

MOHN, H. *Meteorology. (Roald Amundsen's Antarctic Expedition: Scientific Results.)* 78 pp.; diags. *Kristiania Videnskapsselskapets Skrifter: I. Mat.-Naturv. Klasse*, 1915, No. 5. Christiania.

It was eminently appropriate that Dr. Mohn, who prepared for publication the meteorological results of the Nansen Arctic expedition, should have been asked to undertake a similar task in connection with the meteorological observations of Roald Amundsen's Antarctic expedition. The present report is in two parts. The first deals with the observations at Framheim, already well known as the southernmost meteorological station of the world and as having the lowest mean annual temperature hitherto recorded anywhere in the world. The second part contains the observations made on the sledge journey to and from the South Pole.

Readers of the *Review* will probably remember that the meteorological observations made at Framheim were worked out, provisionally, by B. J. Birkeland, at present Director of the Meteorological Observatory of Bergen, and were published, with some of the results, in Amundsen's "The South Pole," Vol. 2, Appendix II, pp. 372-394. In the present report the complete revised observations (April, 1911-Jan., 1912) are printed in the usual "international" form. The yearly mean temperature at Framheim was 24°C. (—11.2°F.). No temperatures above zero C. were observed. The absolute minimum was —59°C. (—64.2°F.). The prevailing winds were from the east and seem to be chiefly incurring cyclonic winds from the sea. Framheim had no such gales as have been reported at other Antarctic stations, as notably by Sir Douglas Mawson for the coast of Wilkes Land, where the wind velocity averaged nearly 50 miles an hour for the year. That particular locality seems to possess the unenviable reputation of being the windiest region in the world: "the home of the blizzard." At Framheim the maximum wind velocity was 45 miles per hour. There was no rain, and snow fell only on every fifth day.

During the sledge journey to and from the Pole particularly valuable wind and pressure observations were made. On the Barrier, lat. 79°-83°, the pressure increases with latitude; it is constant to lat. 86°; it then decreases rather rapidly, and at last more slowly, to the Pole. "The Barrier has an anticyclonic distribution of pressure,

but the Plateau has a distinct, remarkably low pressure." The most frequent wind direction on the Barrier is south by east; on the Glacier, southeast by south; and on the Plateau, southeast. Strong southeast winds are most likely to be accompanied by snow. The results as to pressure and winds indicate that, in December, 1911, in the regions above 2,000 and up to 2,800 meters there were "cyclonic movements of the air, with centers in the northeast quadrant, higher temperature, and a great deal of precipitation." This is in remarkable agreement with the views of Meinardus as stated in his paper, "Aufgaben und Probleme der meteorologischen Forschung in der Antarktis," *Geogr. Zeitschr.*, Vol. 20, 1914, No. 1.

This much-belated notice of a highly interesting and important publication may serve, even at this time, to call attention to the scientific value of the meteorological work of the Amundsen expedition. The "popular" interest in the attainment of the South Pole has subsided. The value of the scientific results of the expedition will endure.

R. DEC. WARD

AULT, J. P. Cruise of the "Carnegie" from South Georgia to Lyttelton, New Zealand, January 14 to April 1, 1916. *Terrestr. Magnet. and Atmospher. Electr.*, Vol. 21, 1916, No. 2, pp. 103-106. [Reference to this and other parts of the Carnegie's cruise was made in the *Review*, Vol. 1, 1916, pp. 146 and 304.]

AULT, J. P. Sea surface-temperature and meteorological observations made on the "Carnegie" during her sub-Antarctic cruise, December 6, 1915, to April 1, 1916. *Terrestr. Magnet. and Atmospher. Electr.*, Vol. 22, 1917, No. 4, pp. 183-189.

BRUCE, W. S. The Weddell Sea: An historical retrospect. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 6, pp. 241-258.

DAVIS, W. G. Observations made at Laurie Island, in the years 1905 to 1910. Part I. 720 pp.; diags. Part II: Climate of the South Orkney Islands: Discussion of the meteorological and magnetical observations made at Laurie Island. viii and 314 pp.; diags., index. *Anal. Oficina Meteorol. Argentina*, Vol. 17. Buenos Aires, 1912 and 1913. [In Spanish and English.]

GAZERT, HANS. Ärztliche Erfahrungen und Studien. (Deutsche Südpolar-Expedition, 1901-1903, von Drygalski.) Map, diags. Vol. 7, No. 4, pp. 299-352. Berlin, 1914.

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MATHER, K. F. Diminution of the Antarctic ice cap and the amelioration of climate. *Science*, No. 1209, Vol. 47, 1918, March 1, pp. 218-219.

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MOHN, H. Roald Amundsens sydpolsfaerd og dens videnskabelige resultater. Map, diags. *Naturen*, Vol. 40, 1916, No. 3, pp. 65-81; No. 4, pp. 97-112. Bergen.

MOSSMAN, R. C. The drift of the "Endurance." *Nature*, No. 2547, Vol. 101, 1918, August 22, pp. 487-488. [Abstract of report by Lieut. J. M. Wordie, "The Drift of the Endurance," *Geogr. Journ.*, Vol. 51, 1918, No. 4.]

SCHETELIG, J. Short summary of the geological features of the known parts of South Victoria Land and associated areas of the Antarctic continent. Map. *Kristiania Videnskapsselskapets Skrifter. I. Mat.-Naturv. Klasse*, 1915, No. 4, pp. 26-30. Christiania. [Part II of Report on Rock Specimens collected on Roald Amundsen's South Pole expedition.]

— Shackleton Antarctic Expedition, The. Maps. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 3, pp. 122-127.

— Shackleton's great adventure in the ice-locked south. Ills. *Collier's*, Vol. 58, 1917, Jan. 20, pp. 15-19. New York. [Illustrated with remarkable photographs by Frank Hurley, photographer of the expedition, showing the *Endurance* in the grip of the Weddell Sea ice, her final disappearance under the floe, and other incidents on the voyage. First publication in this country.]

WATKIN, E. I. Antarctic voyages. *Victorian Geogr. Journ.*, Vol. 33, 1917, Shackleton Souvenir Number, pp. 20-26. Melbourne.

— Weddell Sea, The physical condition of the. *Symons's Meteorol. Mag.*, No. 606, Vol. 51, 1916, July, p. 85. [Abstract of a paper on "Physical Conditions of the Weddell Sea" by Mr. R. C. Mossman at a meeting of the Royal Geographical Society, held on June 15.]

WORDIE, J. M. The drift of the "Endurance." Map, ill. *Geogr. Journ.*, Vol. 51, 1918, No. 4, pp. 216-237 (discussion, pp. 231-237).

PHYSICAL GEOGRAPHY

HYDROGRAPHY AND OCEANOGRAPHY

MATTHEWS, D. J., G. I. TAYLOR, AND L. R. CRAWSHAY. Report on the work carried out by the S. S. "Scotia," 1913. Prefatory report to the President of the Board of Trade, by H. L. Smith. 141 pp. Maps and diagrs. in separate volume. H. M. Stationery Office, London, 1914. 7s. 13 x 8½.

After the loss of the *Titanic*, the *Scotia* was sent to Newfoundland and Labrador waters in 1913 for fifteen weeks of ice-patrol work. In addition to temperature, salinity, and micro-plankton observations at various depths at selected stations, daily observations were made of ice; kind, position, direction, and rate of drift; of the set and velocity of current; and four-hourly observations of weather and sea-surface temperature were taken. Mr. Matthews's report, pp. 4-47, deals with the hydrography; that of Mr. Taylor, pp. 48-68, with the meteorology; and Mr. Crawshaw's, pp. 68-101, with the micro-plankton. There are three great currents in the area under consideration: the East Greenland Current and its continuation, the West Greenland Current; the Labrador Current; and the Gulf Stream. The East Greenland Current carries much sea ice and only a few bergs. On rounding Cape Farewell this mixes with warmer water, so that rarely does any of its ice get as far as Godthaab. Contrary to what might be taken as a matter of course, the East Greenland Current does not contribute ice to the Labrador Current. The West Greenland Current, picking up bergs, goes north to Melville Bay, where the bergs either get lost in Devils Thumb or go west and travel south in Middle Ice, which comes mostly from Smith Sound. West Ice is also from Smith Sound but receives additions from other sounds and from the shore. In Davis Strait these two great ice streams meet to form the Labrador Current. The Labrador Current flows southward carrying field ice and bergs, and splits into three parts on the north edge of the Newfoundland Banks. One branch follows the coast to Cape Race and then turns westward, a second flows along the eastern edge of the Banks, and the third passes eastward to the north of the Flemish Cap. The Gulf Stream after flowing across the southern end of the Labrador Current spreads out on the surface fanwise to the east.

According to Mecking (1907) strong west winds from November to January blow much of the West Ice and coast ice into the Labrador Current. On the other hand, as the bergs come from the west Greenland coast, strong east winds there in summer are followed by a year rich in icebergs in the Labrador Current. North of the Banks the field ice is at a maximum in late winter, while the iceberg maximum comes in early summer.

The *Scotia's* observations showed that "northwards of 50° N. the eastern edge of the Labrador Current was well marked on the surface by the isohaline of 34.00 and followed the edge of the deep water according to the general rule for the movements of oceanic currents. The Labrador Current itself had salinities varying between 33.50 and 32.50 at the surface and increasing downwards, with a temperature falling to a minimum, sometimes as low as -1.8° [C.], at depths between 20 or 30 fathoms and then increasing again. In some cases the cold low salinity water had beneath it a layer of Atlantic water with positive temperature and salinity of over 34.00."

"[In 1913] the velocities observed or calculated were as a rule very low. Off the coast of Labrador in relatively shallow water on the western edge of the Labrador Current the movements of the ice and the surface water were strongly affected even by light winds The fastest permanent drift noted, 0.55 mile per hour in a calm, was that of a berg on the outer edge of the Labrador Current off the south-eastern part of the Banks. On the southern part of the Banks themselves the movement was tidal and very regular, the direction swinging round the compass at a nearly uniform rate, with a resultant of about half a mile a day in an easterly direction at all depths at one station [but somewhat faster on the surface at another]. . . . Off Cape Race in water of about 100 fathoms in depth a surface set of about one-sixth of a knot in a northerly direction was measured instead of one of a knot to the south and west as is normally experienced here."

"Most of the bergs were sighted in water of less than 34 or 34.5 salinity. . . . The majority were naturally found in the colder water, 5° [C.] or less, but some were found in temperatures of 7° [C.] or 8° [C.] (45°-47° Fahr.), and even a temperature of 11° [C.] was observed within a few miles of a berg. . . . A sudden drop of temperature shows as a rule that the ship has entered the polar current, in which ice may be expected but not that there is any ice in the neighborhood, while a rise of temperature shows that the chances of ice being sighted are less on the whole but not that the ship is on safety if she is within the limits to which ice has been known to spread in the past. . . . The ice during 1913 was on the whole held up northwards of the 43rd parallel, and this appears to have been caused by a general drift of water from more southerly latitudes."

Mr. Taylor made a special study of the cooling and warming of air by the water over which it passes. The air temperature coincides generally within 1° or 2° C. with the water surface temperature, the greatest differences occurring with strong winds, and when there is a rapid rate of change in the surface water temperature. For seven out of the fourteen successful kite flights, the probable path of the air for several days previously was determined from weather maps and ship's observations. As was to be expected, when the air is moving from colder to warmer water an adiabatic ("positive") gradient is established to greater and greater heights as the time increases; and when the air moves from warmer to cooler water, a growing temperature inversion ("negative" gradient) occurs. When air after moving southwards turns to the north, the cooling at the bottom gradually changes the "positive" gradient into a "negative" one; while with a turn to the south after a long period of northward movement, an adiabatic gradient may gradually displace from below an extensive inversion of temperature. In all but one case of "negative" temperature gradient, the temperature of the sea was below that of the air; and for all observed "positive" gradients, the water was the warmer. The transmission of heat to and from the higher air layers is accomplished mainly by mixture. This "eddy conductivity" increases with the wind velocity, or with obstacles.

No fog occurred with the four observed "positive" gradients, but fog was present with nine out of the ten "negative" gradients. When relatively dry air is moving over colder and colder water, the temperature of the air may have to fall many degrees before fog occurs. On one occasion, the *Scotia* accompanied a mass of such cooling air until the fog formed. In most cases when the production of fog was observed, it was produced by the mixing of layers of air of different temperatures and humidities, in which the highest water-vapor content was necessarily in the warmer air. Even though the upper limit of the fog is sharp, the actual water content of the air may increase above the top of the fog. A thick fog is often associated with a rapid vertical increase of temperature because the greater the temperature contrast, the greater is the possible supersaturation. Although Mr. Taylor does not mention it, radiation is also a factor in fog formation in warm air over cold water.

As observed, the dispersion of fog results from the blowing of cold air over warm water or from an increase in wind velocity. An increase of wind velocity from 2 to 5 or 6 Beaufort raised the temperature 2°C. by mixture with the warmer air above. This rise of temperature was sufficient to disperse the fog, which later at the lower wind velocity was observed to be 230 meters deep. On another occasion a similar rise in wind and temperature failed to dissipate a fog. This one was found later to be 900 meters deep.

While air is cooled or warmed rapidly by the sea, the heating of the sea surface by the air is relatively small. In one case, when the air had a vertical temperature gradient of -1.9°C. per 100 meters, the heat exchange from air to sea probably was only 23 gm. cal. per sq. cm. per day.

Mr. Crawshaw confined his observations to the micro-plankton because the object was to supplement the hydrographic observations rather than to carry on a biological investigation. There are three classes of the micro-plankton: neritic, oceanic, and intermediate. The distribution of these depends, unlike that of ice, not on the currents but on the physical conditions of the water. The neritic and oceanic types in their distribution mark plainly the edges of the polar and oceanic waters even when there is considerable interdigitation. In the southeast border region intermediate plankton occur to such an extent that there is indicated a considerable mixture of the polar and oceanic waters.

The whole report is not only a valuable contribution to the knowledge of currents, ice, temperatures, and salinities of the northwestern Atlantic, but it also contains an important addition to the study of the relations of air and water temperature and of fog formation in this dangerous quarter of the ocean.

CHARLES F. BROOKS

BRUCE, W. S. Recent advances in oceanography. *Proc. Royal Inst. of Great Britain*, No. 109, Vol. 21, Part II, 1917, pp. 331-334.

GRAVELIUS, H. *Gundriss der gesamten Gewässerkunde*. Vol. 1: *Flusskunde*, viii and 179 pp.; maps, diagrs., index. G. L. Göschen, Berlin and Leipzig, 1914. M. 5. 9½ x 6½. [An excellent collection of laws of river development, presented clearly and with German thoroughness. It is based on studies made in the finely mapped European regions that make an excellent ground for such studies, mostly impossible in this country. The special student of river systems must not neglect it unless he have at hand complete files of German scientific periodicals.—MARK JEFFERSON.]

HUMAN GEOGRAPHY

ANTHROPOGEOGRAPHY

CHISHOLM, G. G. Geography and the population question. *Geogr. Teacher*, No. 47, Vol. 9, 1917, Part I, pp. 54-57.

FALCONER, J. D. The geographical factor in ancient colonisation. *Map. Proc. Royal Philos. Soc. of Glasgow*, Vol. 46, 1914-15, pp. 125-135.

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ECONOMIC GEOGRAPHY

Distribution

PROTHEROE, ERNEST. The railways of the world. xx and 752 pp.; diagrs., ills., index. George Routledge & Sons, Ltd., London, and E. P. Dutton & Co., New York, [1917]. \$2.50. 9 x 6.

Of this book 528 pages are devoted to the railways of the British Isles and 206 to the railways of the rest of the world. Only 27 pages are allotted to the railways of the United States, which has ten times the mileage of the British Isles, while Africa has 24 and Asia 37 pages. In spite of this, the book is a remarkable collection of information on transportation problems and normal railway workings, and its study will stimulate interest in railroads. The story of the growth of the locomotive from "Puffing Billy" to the Mallet oil-fired compounds is told in an absorbing narrative; second in romantic interest being the accounts of engineering skill in constructing the line, especially where great obstacles tend to block progress; and finally the technicalities of running trains. Furthermore, records of specific achievements and a wealth of pictures add to the usefulness of this work.

ROBERT M. BROWN

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[These three lectures trace the history of sea power in relation to neutral trade, discuss the varying significance attached to the popular phrase "freedom of the seas," and attempt to show the results that would follow an acceptance of the principle by the leading maritime nations.]

INDEX

A

- Aaronsohn, Alexander, 86
 Acres, H. G., 190
 Adalia
 Pace, B., *bibliogr.*, 86
 Adaptation, 411
 Adria
 Hydrography (Brückner), *bibliogr.*, 180
 Adrianople, 25
 Adriatic Sea
 Formation (Taramelli), *bibliogr.*, 181
 Aegean Islands, 25
 Aërology
 Drexel Aerological Station, free-air data
 (Gregg and others), *bibliogr.*, 294
 Observations (Blair), *bibliogr.*, 80
 Aëronautics. *See* Aviation
 Africa
 Bibliography, 379, 380
 Big game (Roosevelt), *bibliogr.*, 379
 Central, future boundaries, *note*, 372
 Faunal regions, based on distribution of
 fishes, *note*, 371
 Geographical barriers, The, to the dis-
 tribution of big game animals in Africa
 (with map and ills.) (Heller), 297-319
 Importance (Johnston), *bibliogr.*, 379
 Life zone of eastern equatorial (with
 maps), 298, 302
 New map of Africa, The (1900-1916):
 A history of European colonial expan-
 sion and colonial diplomacy (Gibbons),
 rev., 379
 Pan-Germanism and (Thierry), *bibliogr.*,
 380
 Phytogeography (Engler), *bibliogr.*, 379
 Railroads (Lewin; Torino y Roldán), *bib-*
 liogr., 379, 380
 Roman, historical geography, (Blessich),
 bibliogr., 379
 Thrice Through the Dark Continent: A
 record of journeyings across Africa dur-
 ing the years 1913-16 (Du Plessis), *rev.*,
 378
 Africa, East
 Boundaries of British, *note*, 372
 Scene in Rift Valley (ill.), 300
 See also German East Africa
 Africa, South. *See* South Africa
 "Africanus," *note*, 372
 Agriculture
 Agrarian revolution in Georgia, The,
 1865-1912 (Brooks), *rev.*, 455
 Austria, 62
 Austria (map), Pl. IV, opp. p. 64
 British Isles, increase, *note*, 174
 Finland compared with Minnesota, 198
 Finns, 191
 France, future (Laurens), *bibliogr.*, 183
 Hidatsa Indians (Wilson), *bibliogr.*, 295

Agriculture (*continued*)

- Indians of the Great Lakes region, 512
 Kentucky growing season, *note*, 515
 Meteorology and, *note*, 77
 Meteorology and (Smith), *bibliogr.*, 293
 Michigan surface geology and agricul-
 tural conditions (Leverett), *rev.*, 518
 Spain (Bellet), *bibliogr.*, 522
 Spain (Beltrán y Rózpide), *bibliogr.*, 523
 Tropical America (Cook), *bibliogr.*, 464
 United States, Italians (Gabrici), *bib-*
 liogr., 292
 See also Crops; Farmers and Farming;
 Farms
 Air. *See* Aërology; Atmospheric pressure;
 Meteorology
 Akaroa, N. Z., 335
 Alabama
 Forest census (Harper), *bibliogr.*, 456
 Soil (Harper), *bibliogr.*, 456
 Al-Balâdhuri, 184
 Albania, 24, 36
 Albemarle Island, 229, 232, 233, 234, 235,
 236, 238
 Alberta
 Water power (Mitchell), *bibliogr.*, 290
 Alden, W. C., 519
 Alemtejo
 Irrigation (Ferreira), *bibliogr.*, 523
 Alexander, W. H., 80
 Alfinger, 387
 Algiers
 Lièvre, D., *bibliogr.*, 379
 Alidade for drawing panorama (with ills.),
 501-503
 Alps
 Glacial variations, *note*, 75
 See also under France
 Alsace-Lorraine
 Alsace, Lorraine, et France rhénane
 (Coube), *rev.*, 183
 Alsace-Lorraine and Europe (with map
 and ills.) (Gallois), 89-115
 Boundaries (Holdich), *bibliogr.*, 462
 Economic value (De Launay), *bibliogr.*,
 462
 Evolution of the population (Vidal de la
 Blache), *bibliogr.*, 184
 Minerals, *note*, 175
 Region of localized life, 413
 Territorial changes and mineral resources
 (map), opp. 112
 America
 Modern population (Boas), *bibliogr.*, 463
 See also Americas; United States
 American Geographical Society, 385
 Bulletin index, publication, *note*, 172
 Expedition to the Sierra de Perijá, *note*,
 172

- Amer. Geogr. Soc. (*continued*)
 Lecture announcements, season of 1918-1919, 369, 370 (*note*)
 November monthly meeting, *note*, 513
 Royal Geographical Society's hospitality, *note*, 71
American Journal of Physical Anthropology, establishment, *note*, 289
 American Manufacturers Export Association, *bibliogr.*, 182
 Americans, old white (Hrdlička), *bibliogr.*, 80
 Americas, The
 Big game (Singer), *bibliogr.*, 384
 Compendio de la historia general de América (Navarro y Lamarca), *rev.*, 463
 Early man (Hrdlička), *bibliogr.*, 464
 Food plants and textiles of ancient (Safford), *bibliogr.*, 384
 Malaria eradication (Hoffman), *bibliogr.*, 464
 Real temperatures, The, throughout North and South America (with map and diagrs.) (Jefferson), 240-267
 Temperature stations (map), 241
 Triangulation of all (Woodward), *bibliogr.*, 384
 Tropical agriculture (Cook), *bibliogr.*, 464
 Amundsen's Antarctic Expedition
 Meteorology (Mohn), *rev.*, 524
 Scientific results (Mohn), *bibliogr.*, 525
 Andersen, Karsten, 356, 359
 Andrews, E. C., 382
 Andrews, R. C., 288, 295
 Routes in Yunnan Province (map), 2
 Traveling in China's southland (with ills.), 133-146
 Zoölogical explorations in Yunnan Province, China (with map and ills.), 1-18
 Andrews, Yvette B., 3, 4
 Angot, Alfred, 450
 Animals
 On *savssats*: A crowding of Arctic animals at holes in the sea ice (with map and ills.) (Porsild), 215-228
 Wild life in British Guiana (Beebe and others), *bibliogr.*, 460
 See also Big game; Zoögeography
 Antarctic
 Bibliography, 525, 526
 Deutsche Südpolar-Expedition, 1901-1903, von Drygalski, Vol. 3, Meteorologie, Part 1, Atlas: Meteorologie (Meinardus and Mecking), *rev.*, 523
 Medical results of Drygalski Expedition (Gazert), *bibliogr.*, 525
 Meteorology (Amundsen's Expedition) (Mohn), *rev.*, 524
 Shackleton Expedition, *bibliogr.*, 525
 Voyages (Watkin), *bibliogr.*, 525
 Whale fisheries of South Georgia, *note*, 286
Antarctic (ship), *note*, 288
 Antarctic Continent, *note*, 372
 Antarctica. *See* Australasia
 Anthony, A. H., 282
 Anthony, Harry, 369
 Anthropogeography
 Bibliography, 528
 Anthropology
 Ancient America (Safford), *bibliogr.*, 384
 Chippewa (Hrdlička), *bibliogr.*, 80
 Europe, prehistoric (Giuffrida-Ruggeri), *bibliogr.*, 180
 Finns, 199
 New journal, *note*, 289
 Recent discoveries attributed to early man in America (Hrdlička), *bibliogr.*, 464
 United States government and (Hodge), *bibliogr.*, 80
 See also Ethnology
 Anticyclones
 Types of anticyclones of the United States and their average movements (Bowie and Weightman), *rev.*, 291
 See also Storms
 Apón River, 388, 389, 400, 405, 406, 483, 484, 496, 497
 Looking down upon (ill.), 410
 Looking downstream (ill.), 409
 Valley (ill.), 404
 Aponcito River, 394
 Aspect (ill.), 484
 Aquileia
 Wind rose (Bertolini), *bibliogr.*, 84
 Arabia
 Arabs and (Blink; Dingelstedt), *bibliogr.*, 86
 Bibliography, 86
 Italy and (Presenti), *bibliogr.*, 86
 Arbuckle, Cal., topographic sheet, *map*, 378
 Archeology
 Europe, prehistoric (Giuffrida-Ruggeri), *bibliogr.*, 180
 European civilization (Evans), *bibliogr.*, 180
 Venezuela possibilities, 497, 498
 Yucatan, Córdoba's discovery, 446
 See also Prehistory
 Arctic
 Activities, The, of the Canadian Arctic Expedition from October, 1916, to April, 1918 (with map) (Stefánsson), 354-369
 On *savssats*: A crowding of Arctic animals at holes in the sea ice (with map and ills.) (Porsild), 215-228
 Reizen van Willem Barents, Jacob van Heemskereck . . . (1594-1597) (Naber), *rev.*, 295
 See also Greenland
 Arctic Archipelago, American, 358
 Stefánsson's and MacMillan's recent explorations (map, revised), opp. 368
 Arctic Ocean
 Ice conditions, 1917, 357, 361, 362
 Submarine relief, 358
 Arena, Cal., topographic sheet, *map*, 378
 Arequipa, Peru
 Temperature (with graph), 247
Argo (ship), 368
 Arid coastal zone of Venezuela, 487

Arimpia, Venezuela, 495
 Plain near (ill.), 482
 Arimpia, Ciénaga de (ill.), 493
 Arismendi Falls, 398
 Upper Falls (ill.), 398
 Arizona. *See* Grand Canyon
 Arnold, L. B., 185
 Asia
 Central plateau, 1
 Asia Minor
 Intermixture of races, The, in Asia Minor:
 Some of its causes and effects (Ram-
 say), *rev.*, 85
 Population (Banse), *bibliogr.*, 86
 Asiatic Zoölogical Expedition, 2, 4, 133
 Astori, Bruno, 84
 Athi Plains, Africa, 312, 313 (ill.)
 Atlanta, Ga.
 Climate (Herrmann), *bibliogr.*, 456
 Atlases
 Italian, new, *note*, 288
 Philips' Record Atlas political
 maps of the world, *maps*, 384
 War, western front, *map*, 462
 Atmospheric pressure
 Framheim (Mohn), *bibliogr.*, 525
 Great Lakes (Cox), *bibliogr.*, 80
 Atolls. *See* Coral islands and reefs
 Atwater, Cal., topographic sheet, *map*, 378
 Auckland
 Upper reaches of harbor (diagr.), 329
 Aude
 Human geography (Reverdy), *bibliogr.*,
 183
 Augusta, Ga.
 River stages (Emigh), *bibliogr.*, 455
 Ault, J. P., 525
 Australasia
 Bibliography, 382
 Oxford Survey of the British Empire,
 The: Australasia, including
 Antarctica (Herbertson and Howarth),
rev., 380
 Australia
 Aviation, *note*, 175
 Bibliography, 382
 Rainfall maps for 1916 and 1917, *note*,
 373
 Austria
 Crime, 61
 Crops, 62
 Crops (map), Pl. IV, opp. p. 64
 Emigration, 57, 58, 60
 Farm animals, 62
 Farm animals (map), Pl. V, opp. p. 64
 Frontiers, southern (Freshfield), *bibliogr.*,
 84
 Illiteracy, 59
 Nationalities, 55, 57
 Nationalities (map), Pl. III, opp. p. 64
 Peoples of Austria, The (with maps)
 (Wallis), 52-65
 Physical configuration, 52
 Place names (Hecke), *bibliogr.*, 84
 Population density (map), Pl. II, opp.
 p. 64

Austria (*continued*)
 Relief (map), Pl. I, opp. p. 64
 Statistics, character, 53-54
 Vital statistics, 59
 Austria-Hungary
 Bibliography, 84
 Ergebnisse, Die, der meteorologischen Beo-
 bachtungen auf dem Sonnwendstein
 (Hann), *rev.*, 83
 Flotilla in the Danube, *bibliogr.*, 84
 Linguistic situation (Meillet), *bibliogr.*,
 462
 Trentino, Il: Cenni geografici, storici,
 economici, con un appendice su l'Alto
 Adige (Battisti), *rev.*, 83
 Ukrainian population, 476
 Aveiro, 153
 Aviation
 Meteorology and, in Australia, *note*, 175

B

B—, A., 522
 Babylonia
 Early political development (Olmstead),
bibliogr., 86
 Baganda, 312
 Bagdad
 Climate (Eredia), *bibliogr.*, 86
 Bagdad Railway
 Woods, H. C., *bibliogr.*, 87
 Bagley, J. W., *note*, 71
 Bahama Islands, 37
 Corals (Vaughan), *bibliogr.*, 83
 Map, 38
 Sisal, 49
 Bailey, E. S., 294
 Bailey, W. F., 180
 Baillie Islands (Cape Bathurst), 365
 Bainbridge, O., topographic sheet, *map*, 519
 Baja California. *See* Lower California
 Balaton, Lake
 Geomorphology (Lóczy de Lóczy), *bibliogr.*,
 84
 Balkan Peninsula
 Balkans, The, Macedonia, and the war
 (with map and ills.) (Woods), 19-36
 Balkan states
 Territorial changes in 1912-14 and field
 of present campaign (map), 20
 Balkan Wars, 21, 24-25
 Ball, John, 452
 Baltic Provinces
 Character, 469
 Field of German colonization (map), 467
 German colonization through social con-
 trol, 468
 Map, 522
 Population, 469
 Schmidt, A., *bibliogr.*, 522
 Baltic Sea
 Rabot, Charles, *bibliogr.*, 181
 Bamboo
 Alpine on Mt. Kenya, 314, 317 (ill.)
 Bancroft, H. H.
 Obituary, 77

- Bandelier, A. F.
 Contribution to study of Mexican social life (Waterman), *bibliogr.*, 81
 Banks Island, 362
 Coal discovered, 364
 Interior drainage, 363
 Banks Peninsula, N. Z., 335
 Northern and southern sides (diagrs.), 337
 Port Lyttelton (diagr.), 338
 Banse, Ewald, 86
 Baobab tree (ill.), 306
 Barents, William, 295
 Baringo, Lake
 Looking into Rift Valley south of (ill.), 303
 Barn, Finnish hay, in Minnesota (ill.), 193
 Barquero, Miguel, 450
 Barquero, P. M., 522
 Barron, T., 452
 Barter Island, 365
 Bartlett, R. A., 176
 Bashford, J. W.
 China: An interpretation, *rev.*, 87
 Basutoland
 Flora (Phillips), *bibliogr.*, 463
 Batchelder, Ruth, 455
 Bathhouse, Finnish (with ills.), 210
 Bathurst, Cape, 365
 Batian, Mt. (ill.), 316
 Bats in southern China, 134
 Battisti, Cesare
 Il Trentino: Cenni geografici, storici, economici, con un appendice su l'Alto Adige, *rev.*, 83
 Battle Creek, Mich., topographic sheet, *map*, 519
 Bauer, F. C., 294
 Bay of Islands, N. Z.
 Coast (diagr. and ill.), 327
 Beals, E. A., 80
 Beaufort, S. C.
 Beaufort of the real South, etc. (Batchelder), *bibliogr.*, 455
 Bebel, August, 103
 Beebe, William, 460
 Belgium
 Climate (Day), *bibliogr.*, 180
 See also War, the
 Bell, Hesketh, *note*, 75
 Bellet, Daniel, 522
 Beltrán y Rózpide, Ricardo, 523
 Belvidere, Illinois-Wisconsin, topographic sheet, *map*, 519
 Beneard, Peter, 364
 Beneš, Edouard, 180
 Berlanger, Tomás de, 229
 Bermuda
 Temperature (with graph), 257
 Bernier, J. E., 355
 Berre, l'Étang de
 Germain, Louis, *bibliogr.*, 182
 Bertarelli, L. V., *note*, 288
 Bertolini, G. L., 84
 Besley, F. W., 455
 Bews, J. W., 452
 The plant ecology of the Drakensberg Range, *rev.*, 462
 Bible, seismology in (Montessus de Ballore), *bibliogr.*, 86
 Bibliographies
 Canada history, 1915 (Wrong and others), *bibliogr.*, 291
 Geographic literature (Schoeckel), *bibliogr.*, 464
 Geographical directory, *bibliogr.*, 464
 Portugal, geology of (Choffat and Fleury), *bibliogr.*, 523
 Biermann, Charles, 285
 Big game
 Africa (Roosevelt), *bibliogr.*, 379
 America, North and South (Singer), *bibliogr.*, 384
 Geographical barriers, The, to the distribution of big game animals in Africa (with map and ills.) (Heller), 297-319
 Bigland, Alfred, 288
 Bigourdan, G.
 La climat de la France: Température, pression, vents, *rev.*, 181
 Binder, Otto, 364
 Bingham, W. H., 294
 Biography
 Selkirk (Martin), *rev.*, 290
 Biology
 Galápagos Islands, 232
 Birds
 Cock of the rock (Miller), *bibliogr.*, 460
 Isle of Pines (Todd), *bibliogr.*, 83
 Savvats, 224
 Venezuelan savana, 495
 Birds Landing, Cal., topographic sheet, *map*, 378
 Bistrup, A., 218, 222
 Blache, Paul. *See* Vidal de la Blache
 Bladen, Ga., topographic sheet, *map*, 456
 Blaeu, W. J., 67, 69
 Blair, T. A., 289
 Blair, W. R., 80
 Blanc, Édouard, 521
 Blanchard, Raoul, 75 (*note*), 182, 451
 Blessich, Aldo, 379
 Blink, H., 84, 86
 Boas, Franz, 463
 Böcking, Herr, 112
 Bohemia, 53
 Czechs and (Hrdlička), *bibliogr.*, 84
 Meteorology (Spitaler), *bibliogr.*, 85
 Bolinder, Gustaf
 Det tropiska snöfjällets indianer, *rev.*, 459
 Bolívar Falls, 397, 398
 Upper Falls (ill.), 397
 Bong. *See* Reclus, Onésime
 Bonneval-sur-Arc
 Maige-Lefournier, M., *bibliogr.*, 183
 Booy, Theodoor de, 454
 Expedition to the Sierra de Perijá, *note*, 172
 Exploration, An, of the Sierra de Perijá, Venezuela (with map, diagr., and ills.), 385-410
 Lecture announcement, *note*, 370
 Turks and Caicos Islands, The, British West Indies (with map and ills.), 37-51

- Booy, Theodoor de (*continued*)
 Western Maracaibo lowland, The, Venezuela (with map and ills.), 481-500
- Bordeaux
 Geographic excursion (Irague), *bibliogr.*, 182
- Botany Bay
 Shore line studies (Andrews), *bibliogr.*, 382
- Boulders
 Finnish farm in Minnesota (ill.), 198
- Boundaries
 Africa, central, past and future, *note*, 372
 Alsace, Lorraine, et France rhénane (Coubé), *rev.*, 183
 Alsace-Lorraine (Holdich), *bibliogr.*, 462
 Austria, southern (Freshfield), *bibliogr.*, 84
 British East Africa, *note*, 372.
 Bulgaria, 28, 29
 Galicia (Gerba), *bibliogr.*, 84
 Germany and Alsace-Lorraine in 1871, 112
 Poland (Posner; Ricchieri), *bibliogr.*, 181
 Samoyeds at the end of the seventeenth century (Solberg), *bibliogr.*, 522
 Serbo-Bulgarian, 27 (ill.), 28
 Turco-Persian (Hubbard), *rev.*, 184
See also under Europe
- Bowie, E. H., and R. H. Weightman
 Types of anticyclones of the United States and their average movements, *rev.*, 291
- Braga, 153
- Brainerd, Minn., topographic sheet, *map*, 519
- Branford, Victor, 515
- Braun, E. L., 294
- Brenier, Henri, 453
- Brest-Litovsk, Treaty of, 468, 474
- Bridge of rope, 16
- Briey ore basin, 107, 108, 112, 113
- Britain, British people. *See* British Isles; Great Britain
- British Columbia
 Bibliography, 377
 Developments, recent (Smith), *bibliogr.*, 377
 Early explorations (Palmer), *bibliogr.*, 377
 Economic resources (Unstead), *bibliogr.*, 377
 Forests of central (Christie), *bibliogr.*, 377
 Water power (Conway), *bibliogr.*, 290
 Windermere, *map*, 377
- British East Africa
 Boundaries, *note*, 372
- British Empire. *See* Australasia; British Isles; England; Great Britain; Mediterranean Sea
- British Guiana
 Wild life (Beebe and others), *bibliogr.*, 460
- British Isles
 Food production, *note*, 174
- British West Indies. *See under* West Indies
- Brittany
 Gallouédec, L., *bibliogr.*, 182
 Medill, Robert, *bibliogr.*, 183
 Regionalism and nationalism (Mocaër), *bibliogr.*, 183
- Brooks, A. A., 172
- Brooks, C. E. P., 88
- Brooks, R. P.
 The agrarian revolution in Georgia, 1865-1912, *rev.*, 455
- Brounow, P., 522
 Schematische Karten der Wahrscheinlichkeit des Auftretens der trockenen Dekaden, *rev.*, 521
- Brown, G. St. J. Orde, 373
- Brown, J. C., 88
- Brown, R. N. Rudmose, 374
- Brownlee, J. H., 376
- Bruce, W. S., 525, 528
- Brückner, Eduard, 180
- Brunhes, Jean, 462
- Brunhes, Jean, and Camille Vallaux
 German colonization in eastern Europe (with map), 465-480
- Brunoff. *See* Brounow
- Bucharest
 Treaty of, 25
- Buck, S. J., 519
- Buenos Aires
 Temperature (with graph), 252
- Buildings
 Finnish (ills.), 190, 193-195, 210
See also Houses
- Bukovina
 Pawlowski, S., *bibliogr.*, 85
- Bulgaria, 21, 24, 25, 35, 36
 Attitude in the war, 26
 Importance of geographical position, 28
- Bulgarians, 34
 Peasants (ill.), 35
- Burke, Dr., 368, 369
- Burma, 142, 143
- Burmese girl (ill.), 140
- Bushnell, D. I., Jr., 455
- Bussaco, 153
- Butler, G. M., 289

C

- Cachapoal canal, *note*, 371
- Caicos Bank, 44, 45, 46
- Caicos Islands, 37, 38, 44, 46
 Turks and Caicos Islands, British West Indies (with map and ills.) (Booy), 37-51
- Cairo
 Lièvre, D., *bibliogr.*, 379
- California
 Arena, Arbuckle, Atwater, Birds Landing, Gustine, Logan Creek, Planada, Stevinson, and Williams topographic sheets, *maps*, 378
 Dry thunderstorm, *note*, 284
 Early life (Williams), *bibliogr.*, 457
 Earthquakes (Wood), *bibliogr.*, 457
 Lower. *See* Lower California
 Scenery (Saunders), *bibliogr.*, 456

- Camel Mountain, N. M.
Topographic sheet, *map*, 378
- Camp Sherman, O., topographic sheet, *map*, 519
- Camsell, Charles, 377
- Canada
Bibliography, 290, 376
Canadian Commonwealth (Laut), *bibliogr.*, 290
Commerce with British West Indies (Griffin), *bibliogr.*, 82
Historical publications in 1915 (Wrong and others), *bibliogr.*, 291
Lord Selkirk's work in Canada (Martin), *rev.*, 290
Meteor fall in northern, *note*, 282
Tide levels in eastern (Dawson), *bibliogr.*, 290
Timber industry, history (Lawler), *bibliogr.*, 290
Trees (Morton and Lewis), *bibliogr.*, 290
War's economic effect (Shortt), *bibliogr.*, 291
Water powers, *bibliogr.*, 290
West Indies and (Lewin), *bibliogr.*, 290
- Cañada (ill.), 485
- Canadian Arctic Expedition. *See under* Arctic, or Stefánsson
- Canadian National Parks
Geology (Camsell), *bibliogr.*, 377
- Canadian Pacific Railway
Early explorations in British Columbia (Palmer), *bibliogr.*, 377
Geology (Camsell), *bibliogr.*, 377
- Canadian Rockies
Experiences in (Hickson), *bibliogr.*, 377
Meteorology (Wheeler), *bibliogr.*, 377
See also Peace River
- Canal Zone
"Northers," *note*, 73
See also Panama Canal
- Canals
German project of uniting North and Black Seas (Rágóczy), *bibliogr.*, 184
Marne-Rhine, etc., 106, 114
See also Waterways
- Canoe trip. *See* Peace River
- Canterbury, N. Z.
River-valley orientation (Speight), *bibliogr.*, 383
- Canterbury College Mountain Biological Station
Plant associations near (Cockayne and Loweraker), *bibliogr.*, 382
- Canterbury Plain, N. Z., 335
Formation (Speight), *bibliogr.*, 383
- Cape. *See* name of cape
- Cape Fear River
Chronicles of the Cape Fear River (Sprunt), *rev.*, 518
- Capus, Guillaume, 453
- Caracas, 385
- Carandell, Juan, 523
- Caribbean Petroleum Company, 386, 400, 495, 497, 499
- Carman, J. E., 294
- Carnegie (ship)
Cruise from South Georgia to Lyttleton (Ault), *bibliogr.*, 525
Observations on sub-Antarctic cruise (Ault), *bibliogr.*, 525
- Carpathian forelands, 52
- Carso. *See* Karst
- Carter, A. F., 88
- Cartography
Dutch cartographers of the seventeenth century (Cross), 66-70
Portuguese (Vasconcellos), *bibliogr.*, 523
Ptolemy's maps of northern Europe (Schütte), *rev.*, 519
- Cascade Range
Scenery (Williams), *bibliogr.*, 457
- Cass district, N. Z.
Physiography (Speight), *bibliogr.*, 383
- Castel, Aarnaut, 355, 356, 365
- Catellani, Enrico, 88
- Catoche, Cape, 443, 446, 448
- Cattle. *See* Live stock
- Caucasia
Bibliography, 86
- Caucasus
Central, conditions (Raeburn), *bibliogr.*, 87
Lakes (Morosoff; Posnanski), *bibliogr.*, 521
Migration of Japhetic peoples (Marr), *bibliogr.*, 521
- Caves
Burial cave in Venezuela, 401, 408
Southern China, 134
- Cayos, 46
- Cedar
Texas, *note*, 173
- Cederblom, Gerda, 180
- Censuses
Austrian, character, 54
South Dakota, 1915 (Robinson and Stevenson), *bibliogr.*, 295
United States immigrant stocks (Folkmar), *bibliogr.*, 80
- Central America
Bibliography, 80, 458
Cattle countries (Sandberg), *bibliogr.*, 81
Süd- und Mittelamerika (Sievers), *rev.*, 459
- Central Association of Science and Mathematics Teachers, 464
- Cereals. *See* Grain
- Cereceda, J. D., 523
- Cervantes de Salazar, Francisco
On Córdoba's discovery of Yucatan, 438, 439, 445
- Chakh-dag
Posnanski, M., *bibliogr.*, 522
- Challenge (ship), 364, 365
- Chamberlin, T. C., 519
- Chaparral
Texas, *note*, 173
- Charles Island, 229, 230, 238
- Chatham Island, 229, 232, 238, 239
- Chevallier, A., 182

- Chiapas
 Geography and statistics, *bibliogr.*, 81
- Chihuahua
 Geography and statistics, *bibliogr.*, 81
- Childs, W. J., 86
- Chile
 Irrigation, *note*, 370
- China
 Anthropology (Muller), *bibliogr.*, 88
 Bibliography, 88, 295
 China: An interpretation (Bashford), *rev.*, 87
 Coal mining (Reed), *bibliogr.*, 295
 Meteorology (Brooks), *bibliogr.*, 88
 Meteorology, coast (Dines), *bibliogr.*, 88
 Over den Chinaschen handel der Oost-Indische Compagnie in de eerste dertig jaar van de 18e eeuw (Hullu), *rev.*, 87
 Plant exploration (Meyer), *bibliogr.*, 88
 Traveling in China's southland (with ill.) (Andrews), 133-146
 Travels in (Andrews; Robertson; Van Biema), *bibliogr.*, 295
 Typhoons of 1911 (Chu), *bibliogr.*, 88
 Village and town life (Leong and Tao), *bibliogr.*, 88
 Yunnan Province. *See* Yunnan
- Chippewa Indians, 507
 Anthropology (Hrdlička), *bibliogr.*, 80
- Chisholm, G. G., 180, 464, 528
- Chisholm, Minn.
 Finnish farm (ill.), 198
- Choffat, P., 523
- Cholnoky, Eugen de, 84
- Christie, H. R., 377
- Christy, Cuthbert, *note*, 75
- Chu, Co-Ching, 88
- Chudeau, René, 453
- Chudes, 470
- Chung-tien, 13, 14, 15
- Church. *See* Religion
- Ciénaga de Arimpia (ill.), 493
- Cincinnati
 Vegetation of region (Braun), *bibliogr.*, 294
- Cintra, 154
- Cirques
 Sisca (Rouch), *bibliogr.*, 183
- Citania, 153
- Cities
 Alsace-Lorraine, growth, 107
 Economic types of Italian and American (Marinelli), *bibliogr.*, 528
 Lausanne, geographical study, *note*, 285
 Movement to, Austria, 60-61
See also Towns
- Civilization
 Archeological light on European (Evans), *bibliogr.*, 180
 Western Europe, unity (Marvin, edit.), *bibliogr.*, 461
- Clark, V. S., 292
- Clemen, Bruno
 Kriegsgeographie: Erdkunde und Weltkrieg, etc., *rev.*, 383
- Cliffs
 Paekakariki, N. Z. (ill.), 332
 Wellington, N. Z. (ill.), 330
- Climate
 Antarctic (Mather), *bibliogr.*, 525
 Atlanta, Ga. (Herrmann), *bibliogr.*, 456
 Bagdad (Eredia), *bibliogr.*, 86
 Belgium and France (Day), *bibliogr.*, 180
 Cuba (Gutiérrez-Lanza), *bibliogr.*, 82
 Finland compared with Minnesota, 196
 France, Le climat de la: Température, pression, vents (Bigourdan), *rev.*, 181
 France and Belgium (Day), *bibliogr.*, 180
 Galápagos Islands, 236
 Illinois (Mosier), *bibliogr.*, 294
 Maracaibo, Lake, western shore, 485
 Maryland, plant growth (McLean), *bibliogr.*, 456
 Salt Lake City (Thiessen), *bibliogr.*, 457
 South Orkneys (Davis), *bibliogr.*, 525
 Tornadoes in the United States, *note*, 71
See also Temperature
- Climatology
 Spain, Quaternary (Obermaier and Carandell), *bibliogr.*, 523
 United States thunderstorms and tornadoes (Ward), *bibliogr.*, 293
See also Meteorology; Rainfall; U. S. Weather Bureau; Weather
- Cloquet, Minn., *note*, 513
- Club Alpin de Crimée et du Caucase (Smirnov), *bibliogr.*, 522
- Coahuila
 Geography and statistics, *bibliogr.*, 81
- Coal
 Banks Island, 364
 China, mining (Reed), *bibliogr.*, 295
 German exploitation, 108
 Germany, *note*, 175
 Spitzbergen, *note*, 374
 United States production and trade (Erskine), *bibliogr.*, 292
- Coasts
 Arctic islands, 361
 Botany Bay (Andrews), *bibliogr.*, 382
 Classification, tabular, 326
 New Zealand, The outline of (with map, diagrs., and ill.) (Cotton), 320-340
 Young depressed, at Port Nicholson, N. Z. (ill.), 333
See also Fault coasts
- Cock of the rock, a naturalist's quest of (Miller), *bibliogr.*, 460
- Cockayne, A. H., 382
- Cockayne, L., 382
- Cockburn Harbour (East Harbour), 39, 42, 48-49
- Cockburn Town, Grand Turk Island, 41
 View (ill.), 40
- Coeur d'Alene National Forest (map and panorama), opp. 502
- Cogollo River, 400, 493, 498
- Coimbra, 154
- Colby, C. C., 375
- Cold
 Tropical, 401
See also Temperature

- Colombia
 Bibliography, 460
 Descriptive data, *bibliogr.*, 460
 Ethnography (Márquez), *bibliogr.*, 460
 Indian tribes, 389
 Meteorology (Lleras), *bibliogr.*, 460
 Military geography (Mercado), *bibliogr.*, 460
 Tropiska snöfjällets indianer, Det (Bolin-der), *rev.*, 459
- Colonia 16 de Octubre, Argentina
 Temperature (with graph), 253
- Colonization
 Africa, The new map of (1900-1916): A history, etc. (Gibbons), *rev.*, 379
 Africa and Pan-Germanism (Thierry), *bibliogr.*, 380
 Ancient (Falconer), *bibliogr.*, 528
 German colonization in eastern Europe (with map) (Brunhes and Vallaux), 465-480
 German theory and its two forms, 468
 Palestine (Masterman), *bibliogr.*, 86
- Colorado
 Del Norte topographic sheet, *map*, 378
 Northern, foothills structure (Ziegler), *bibliogr.*, 457
 Plants on abandoned roads (Shantz), *bibliogr.*, 456
 Sandstones (Vail), *bibliogr.*, 457
 Vegetation (Vestal), *bibliogr.*, 457
- Colorado Desert
 Excursion to (Stephens and others), *bibliogr.*, 457
- Colorados reefs (Henderson), *bibliogr.*, 82
- Columbia River gorge, geology (Williams), *bibliogr.*, 457
- Columbia River Highway (Williams), *bibliogr.*, 457
- Columbus, Ohio
 Geography of quadrangle (Hubbard), *bibliogr.*, 294
- Commerce
 Agricultural commerce: The organization of American commerce in agricultural commodities (Huebner), *rev.*, 79
 British West Indies and Canada (Griffin), *bibliogr.*, 82
 Canada and the West Indies (Lewin), *bibliogr.*, 290
 Coal in the United States (Erskine), *bibliogr.*, 292
 France, *bibliogr.*, 182
 France, foreign (Landry), *bibliogr.*, 182
 Germany (Snow and Kral), *bibliogr.*, 462
 Santo Domingo and the United States in the 18th century (Treudley), *bibliogr.*, 83
 World's, in 1913 and 1917 (Macfarlane), *bibliogr.*, 464
- Conchs in the Caicos Islands, 46
- Condra, G. E., 294
- Congo forest, 318
- Consciencia, M. S., 463
- Conservation of water (McCulloh), *rev.*, 292
- Constantinople
 Turco-Bulgarian treaty, 25, 26
- Conway, G. R. G., 290
- Cook, O. F., 464
- Cook Strait, 323
 Shore (ill.), 332
 Submarine channel (map), 321
- Coquimbo, *note*, 370
- Coral islands and reefs
 Florida (Vaughan and Shaw), *bibliogr.*, 456
 Floridian and Bahaman (Vaughan), *bibliogr.*, 83
 West Indian, geology (Vaughan), *bibliogr.*, 83
- Corbellini, P., *note*, 288
- Corbett, J. S.
 England in the Mediterranean, etc., *rev.*, 383
- Córdoba, Francisco Hernández de
 Discovery, The, of Yucatan in 1517 by Francisco Hernández de Córdoba (with maps) (Saville), 436-448
- Cork oaks, 148
 Portugal (ill.), 150
- Correspondence, 77
- Cortés, Hernando, "First Letter," 441
- Cotton
 Caicos Islands, 39, 48
- Cotton, C. A., 382
 Block Mountains in New Zealand, *rev.*, 380
 Outline of New Zealand, The (with map, diagrs., and ills.), 320-340
- Coubé, Stéphen
 Alsace, Lorraine, et France rhénane, *rev.*, 183
- Courland, 469
Map, 522
- Cowles, H. C., 517
- Cox, H. J., 80
- Crawshay, L. R. *See* Matthews, D. J., G. I. Taylor, and L. R. Crawshay
- Crete
 Vegetation (Rikli), *bibliogr.*, 181
- Crime in Austria, 61
- Croatia-Slavonia, 341
- Croats, 341
- Crocodiles
 As barriers to game distribution, 307
 Guardian of the Tana River (ill.), 308
- Crops
 Temperature and, *note*, 77
See also Agriculture; Farmers and farming; Farms
- Cross, W. R.
 Dutch cartographers of the seventeenth century, 66-70
- Crossbow of Yünnan (ill.), 10
- Cuba
 Climate (Gutiérrez-Lanza), *bibliogr.*, 82
 Descriptive data, *bibliogr.*, 82
 Malaria and yellow fever (Le Prince and Orenstein), *bibliogr.*, 458
 Scientific expedition (Henderson), *bibliogr.*, 82
- Cumin, Gustavo, 84

- Cuzco, Peru
 Temperature (with graph), 249
- Czecho-Slovaks
 Place among Slavs (Beneš), *bibliogr.*, 180
- Czechs
 Austria, 56
 Bohemia and (Hrdlička), *bibliogr.*, 84
- D**
- Dalgado, D. G., 147
- Dalmatia, 52
- Daly Waters, Australia, 243
- Danube
 Austrian flotilla, *bibliogr.*, 84
- Darton, N. H., 292
 Story of the Grand Canyon of Arizona, *rev.*, 377
- Dauphiné
 Forests (Gadoud), *bibliogr.*, 182
- Davenport, Iowa
 Weather elements (Udden), *rev.*, 293
- Davis, W. G., 525
- Davis, W. M., 375, 450
- Dawson, W. B., 290
- Dawson City
 Temperature (with graph), 255
- Day, P. C., 180
- Daylight saving, geographical aspects (with diag.), *note*, 449
- De Rebus Gestis Ferdinandi Cortesii, 440, 444
- Dealy Island, 355, 362
- De Booy. *See* Booy
- De Land, Charles, 284
- De Launay, L., 175, 462
- Delaware
 Millsboro topographic sheet, *map*, 456
- Del Norte, Col., topographic sheet, *map*, 378
- Democracy in Alsace-Lorraine, 102
- Demography. *See* Population
- Deniker, Joseph
 Obituary, 177
- Denver
 Temperature (with graph), 263
- Deserts
 Flora of Kalahari (Phillips), *bibliogr.*, 462
 Irrigation in western United States (Woehlke), *bibliogr.*, 457
 Kalahari, 452
- Detroit
 Detroit folio (Sherzer), *rev.*, 293
 Historical geography of Detroit, The (Parkins), *rev.*, 519
 Manufactures, *bibliogr.*, 294
- Deutsche Südpolar-Expedition. *See* Antarctic
- Devereaux, W. C., 294
- Devraigne, Georges, 453
- De Vries, H., 382
- Díaz, Bernal, on Córdoba's discovery of Yucatan, 441, 443
- Dickson, J. Q., 288
- Dinaric Alps
 Seasonal migration, *note*, 73-74
- Dines, J. S., 88
- Dingelstedt, V., 86
- Directory, geographical, *bibliogr.*, 464
- Discovery
 Macoita River waterfalls, *note*, 172
 Recent discoveries attributed to early man in America (Hrdlička), *bibliogr.*, 464
 Yucatan, The discovery of, in 1517 by Francisco Hernández de Córdoba (with maps) (Saville), 436-448
See also Exploration
- Disko Bay
Savssats (with map and ill.), 215-228
- Disko Island
 Shore (ill.), 219
- Distribution
 Bibliography, 528
 Canada's grain exports (Rabot), *bibliogr.*, 291
 Railways of the world (Protheroe), *rev.*, 528
- Distribution, animal. *See* Zoögeography
- Distribution, plant. *See* Phytogeography
- Diversity, The origin and maintenance of, in man (Newbigin), 411-420
- Divi-divi trees, 487 (ill.), 488
- Divining rod, *note*, 76
- Dodge, R. E., 464
- Dolot, G., 86
- Dominican Republic. *See* Santo Domingo
- Donnersberg
 Meteorology (Spitaler), *bibliogr.*, 85
- Douro River
 Wine industry (ills.), 149
- Downes, T. W., 382
- Drainage
 United States (Newell), *bibliogr.*, 292
- Drakensberg
 Forest progress (Henkel), *bibliogr.*, 463
 Plant ecology of the Drakensberg Range, The (Bews), *rev.*, 462
- Drexel Aerological Station
 Free-air data (Gregg and others), *bibliogr.*, 294
- Dry-forest zone of Venezuela, 488
- Drygalski. *See* Antarctic
- Duluth
 Fire, *note*, 513
- Dûm palms, 309, 315 (ill.)
- Dunes
 Gascony (Harlé), *bibliogr.*, 182
 Indiana (Bailey), *bibliogr.*, 294
- Du Plessis, J.
 Thrice through the Dark Continent: A record of journeyings across Africa during the years 1913-16, *rev.*, 378
- Duruma, 304
- Dust fall, *note*, 514
- Dutch. *See* Low Countries
- Dutch East India Company. *See* Hullu
- Dutch West Indies. *See under* West Indies
- Dvina River
 Teutonism in the region, 471
- Dwellings. *See* Houses
- Dyatchishin, M., 522

E

- Earth science. *See* Geography
- Earthquakes
 California (Wood), *bibliogr.*, 457
 Guatemala (Morley), *bibliogr.*, 458
 Jamaica (Hall), *bibliogr.*, 82
 Mexico to 1917 (Lumbier), *bibliogr.*, 458
 Western United States, problem (Wood), *bibliogr.*, 457
- East Africa. *See* Africa, East; German East Africa
- East Caicos, 46
 Sisal (ills.), 47
 Sisal industry, 48, 49
- East Harbour. *See* Cockburn Harbour
- East India Company, Dutch. *See* Hullu
- Eastern Question. *See* Near East
- Economic colonization
 Germans in the Ukraine, 474
- Economic geography
 Grassland in New Zealand (Cockayne), *bibliogr.*, 382
 Spitzbergen, *note*, 374
 Ukraine resources, 478
See also Distribution; Production
- Economics
 British Columbia (Unstead), *bibliogr.*, 377
 Canada, effect of war (Rabot), *bibliogr.*, 291
 Central Europe as a unit (Chisholm), *bibliogr.*, 120
 Economic development of modern Europe (Ogg), *rev.*, 178
 War aspects (Van Hise), *bibliogr.*, 293
- Ecuador
 Galapagos Islands and, 230, 239
- Edith Cavell, Mt.
 First ascent (Holway), *bibliogr.*, 377
- Education, geographic
 Problems (Dodge), *bibliogr.*, 464
- Educational geography
 Bibliography, 464
- Edwards Plateau, *note*, 173
- Eland, domesticated (ill.), 313
- Ellef Ringnes Island, 361
- Ellis, A. J., *note*, 76
- Elmenteita, Lake
 Rift Valley at (ill.), 302
- Embarrass, Minn.
 Finnish farm (ill.), 190
 Finnish pioneer home (ill.), 193
- Emeralds, Valley of (Muzo, Colombia) (Pogue), *bibliogr.*, 461
- Emigh, E. D., 455
- Emigration
 Austria, 57, 58, 60
 Central Hungary, 428
 Rumanian in Hungary, 164
 Slavs of northern Hungary, 274
 Slavs of southern Hungary, 347
- Emiu (Eskimo), 359
- Endurance (ship)
 Drift (Mossman), *bibliogr.*, 525
 Drift (Wordie), *bibliogr.*, 526
- Engerand, Fernand, 175
- England
 England in the Mediterranean, etc. (Corbett), *rev.*, 383
- Engler, A., 379
 African floral regions, *note*, 371
- Environment, effect on man, 416
- Equatorial Africa. *See under* Africa
- Eredia, Filippo, 86
- Erosion
 Western grazing lands (Sampson and Weyl), *bibliogr.*, 456
- Erskine, J. Y., 292
- Eruptions
 Galápagos Islands, 234
- Eskimos
 Fishing in kayaks (ills.), 130, 131
 Ungava Peninsula, 127, 132
 War effects, *note*, 286
See also Arctic; Greenland
- Esthonia, 469
 Map, 522
- Estrella. *See* Serra da Estrella
- Ethiopia
 Faunal regions, 301
- Ethnography
 Colombia (Márquez), *bibliogr.*, 460
- Ethnology
 Austria, 52
 Austria (with maps) (Wallis), 52-65
 Czechs and Bohemia (Hrdlička), *bibliogr.*, 84
 Mexico, ancient (Waterman), *bibliogr.*, 81
 Slavs (Niederle), *bibliogr.*, 180
See also Anthropology
- Euphorbia, 312
 Giant tree (ill.), 306
- Europe
 Archeological light on civilization (Evans), *bibliogr.*, 180
 Bibliography, 180, 461, 462, 520
 Central Europe as an economic unit (Chisholm), *bibliogr.*, 180
 Eastern, war theater, *map*, 462
 Economic development of modern Europe (Ogg), *rev.*, 178
 Europe v. Middle Europe (Lyde), *rev.*, 178
 Geography of northern and central according to Ptolemy (Schütte), *bibliogr.*, 181
 German colonization in eastern Europe (with map) (Brunhes and Vallaux), 465-480
 Grande Géographie Bong illustrée (Reclus), Vols. 1 and 2, *rev.*, 378
 Industrial revolution in western (Newbigin), *bibliogr.*, 462
 Map, 521
 Movement of population (Methorst), *bibliogr.*, 520
 Non-European world and (Muir), *bibliogr.*, 520
 Peninsularity (Supan), *bibliogr.*, 520
 Prehistoric (Giuffrida-Ruggeri), *bibliogr.*, 180, 520

- Europe (*continued*)
 Ptolemy's maps of northern Europe (Schütte), *rev.*, 519
 Regional consciousness and nationality in Western, *note*, 515
See also Alsace-Lorraine; War, the
 Evans, Arthur, 180
 Eveleth, Minn., 213
 Everglades
 Reclaiming (Randolph), *bibliogr.*, 456
 Evora, 155
 Ewell, Virginia-Maryland, topographic sheet, *map*, 456
 Excursion to Bordeaux and the south of France (Irague), *bibliogr.*, 182
 Expeditions
 Amundsen's Antarctic, 524
 Amundsen's Antarctic, scientific results (Mohn), *bibliogr.*, 525
 Asiatic Zoölogical, 133
 Canadian Arctic, 354
 Cruise of the *Tomas Barrera* (Henderson), *bibliogr.*, 82
 Deutsche Südpolar-Expedition, 1901-1903, von Drygalski, etc., *rev.*, 523
 San Diego to Colorado Desert (Stephens and others), *bibliogr.*, 457
 Shackleton Antarctic, *bibliogr.*, 525
 Sierra de Perijá. *See that title*
 Spitzbergen 1917, *note*, 374
 Thule, first, Rasmussen's journal, *rev.*, 296
 Thule, second, *note*, 286
 Trebizond (Uspenskij), *bibliogr.*, 87
 Exploration
 Arctic, recent, Stefánsson and MacMillan, with routes (*map*, revised), opp. 368
 Asia, central, 1
 British Columbia, early (Palmer), *bibliogr.*, 377
 Greenland, Rasmussen, *note*, 285
 Lewis and Ordway journals (Quaife), *bibliogr.*, 293
 Mt. Edith Cavell and Mt. Longstaff region (Holway), *bibliogr.*, 377
 Purcell Range (Stone), *bibliogr.*, 377
 Sierra de Perijá, Venezuela, An exploration of the (with *map*, *diagr.*, and *ills.*) (Booy), 385-410
 Ungava Peninsula, 116
 Verendrye family, *note*, 283
 Yünnan Province, 1-18
See also Discovery
 Explorers' Club flag (*ill.*), 394
- F**
- Falconer, J. D., 528
 Falkland Islands
 Whale fisheries of South Georgia, *note*, 286
 Far East
 Catellani, E., *bibliogr.*, 88
 Farm animals. *See* Live stock
 Farmers and farming
 Finn on hayrake (*ill.*), 206
 Farmers and farming (*continued*)
 Russia, "dryness" charts, *bibliogr.*, 522
See also Agriculture
 Farms
 Finnish, showing boulders, Minnesota (*ill.*), 198
 Finnish farm in Minnesota (*ill.*), 190
See also Agriculture
 Farnam, H. W., 292
 Fassig, O. L., 82
 Fault coasts, 320
 Wellington, N. Z. (*ill.*), 331
 Fauna. *See* Zoögeography
 Faure, Maurice, 182
 Ferreira, E. de B., 523
 Fertilizers
 United States situation (Pogue), *bibliogr.*, 293
 Fiennes, Gerard, 528
 Finland
 Comparison with northeastern Minnesota, 195
 Finnish life, 199
 Finns
 Cartograms showing distribution, etc., in the United States (*maps*), 186, 187
 Farm with buildings in Minnesota (*ill.*), 190
 Finn in America, The (with *maps* and *ills.*) (Van Cleeef), 185-214
 Groups of children (*ills.*), 209
 Minnesota distribution in relation to forest (*map*), 204
 Types of leaders in Minnesota (*ills.*), 213
 Fiords
 Milford Sound, N. Z. (*ill.*), 339
 New Zealand, 340
 First Island (Stefánsson's), 356, 357
 Firth, C. H., 290
 Fish
 Africa, distribution of freshwater, *note*, 371
 Fishing
 Eskimo (*ills.*), 130, 131
 Indians of the Great Lakes region, 507, 510, 511
 Portugal, smacks at Lisbon (*ill.*), 151
 Five Nations of New York, 504
 Flaherty, R. J.
 Two traverses across Ungava Peninsula, Labrador (with *map* and *ills.*), 116-132
 Fleagle, F. K., 82
 Fleure, H. J., 180, 451, 515, 528
 Fleury, E., 523
 Floods
 Ohio Valley forecasts (Devereaux), *bibliogr.*, 294
 Floodwood, Minn.
 Finnish buildings (*ills.*), 193, 194, 210
 Finnish farmer on hayrake (*ill.*), 206
 Flora
 Finland compared with Minnesota, 197
 Leribe Plateau (Phillips), *bibliogr.*, 463
See also Phytogeography
 Florida
 Corals (Vaughan), *bibliogr.*, 83

- Florida (*continued*)
 Everglades, reclaiming (Randolph), *bibliogr.*, 456
 Forests (Harper), *bibliogr.*, 456
 Lawtey topographic sheet, *map*, 456
 Soil of Pinellas County, *map*, 456
- Florida-Georgia
 Macclenny topographic sheet, *map*, 456
- Flying. *See* Aviation
- Fog
 Forecasting in the United States (Frankenfield), *bibliogr.*, 80
- Folkmar, Daniel, 80
- Folliasson, Mme., 182
- Food
 Ancient America, plants (Safford), *bibliogr.*, 384
 British Isles, production, *note*, 174
- Forecasts
 Fog in the United States (Frankenfield), *bibliogr.*, 80
 Ohio Valley river stages and floods (Devereaux), *bibliogr.*, 294
 Weather favorable to forest fires (Beals), *bibliogr.*, 80
See also Weather
- Forest fires
 Minnesota, *note*, 513
See also Lookout stations
- Forestry
 Forestry in the Dominion of New Zealand (Schlich), *rev.*, 381
- Forests
 African highland, 312, 314
 African tropical, 318
 Alabama (Harper), *bibliogr.*, 456
 British Columbia, central (Christie), *bibliogr.*, 377
 Buried, near Riccarton, N. Z. (Speight), *bibliogr.*, 383
 China, waste, 5
 Coeur d'Alene National (map and panorama), *opp.* 502
 Dauphiné (Gadoud), *bibliogr.*, 182
 Drakensberg (Henkel), *bibliogr.*, 463
 Florida (Harper), *bibliogr.*, 456
 France, submerged (Welsch), *bibliogr.*, 183
 Indian's forest economy in the Great Lakes region, 509, 510
 Kakamwega, 315 (*ill.*), 318
 Maryland (Besley), *bibliogr.*, 455
 Minnesota, Finn distribution in relation to (*map*), 204
 Porto Rico (Murphy), *bibliogr.*, 83
 Texas resources, *note*, 173
 Venezuela dry-forest zone, 488
 Weather favorable to fires (Beals), *bibliogr.*, 80
See also Trees
- Forsyth, Lake, 336, 337
- Fort Archambault, Central Africa, 243
- Fort Chino, 117, 123
 Tree limit near (*ill.*), 118
 View with Koksoak River (*ill.*), 125
- Fort Yukon, Alaska, 354, 368
 News from Stefánsson and description of fall of meteor, *notes*, 282
- Fossils
 China, 8
 West Indies, coral (Vaughan), *bibliogr.*, 83
- Foster, J. H., 173, 174
- Foveaux Strait, N. Z., 338
- Foweraker, C. E., 382
- Framheim
 Atmospheric pressure (Mohn), *bibliogr.*, 525
- France
 Agriculture, future (Laurens), *bibliogr.*, 183
 Alpine streams (Blanchard), *bibliogr.*, 182
 Alps: hydro-electric power, *note*, 451
 Alsace, Lorraine, et France rhénane (Coubé), *rev.*, 183
 Bibliography, 182
 Climat de la France, Le: Température, pression, vents (Bigourdan), *rev.*, 181
 Climate (Day), *bibliogr.*, 180
 Foreign commerce (Landry), *bibliogr.*, 182
 Geographic excursion to the south of France (Irague), *bibliogr.*, 182
 Hill towns (Fryer), *bibliogr.*, 182
 Industrial region of north, 115
 Levant and (Lamy), *bibliogr.*, 86
 Mesopotamia and (Dolot), *bibliogr.*, 86
 Minerals, *note*, 175
 Reconstruction, *bibliogr.*, 182
 Resources in west and west-central (Welsch), *bibliogr.*, 183
 Transition region, *note*, 516
See also War, the
- Frankenfield, H. C., 80
- Freedom of the seas
 Fiennes, G.; Leyland, John; Piggott, F. T., *bibliogr.*, 528
- French Indo-China
 Resources, *note*, 453
- French Revolution, 101
- Freshfield, D. W., 84
- Fribourg, André, *note*, 73
- Fritz, Emanuel
 A combined map and panorama for orientation from lookout stations (with map and *ills.*), 501-503
- Frontier
 California, early life (Williams), *bibliogr.*, 457
 Virginia in 1778 (Bushnell), *bibliogr.*, 455
- Frontiers. *See* Boundaries
- Frosts in Kentucky, *note*, 515
- Fry, Henry, 368
- Fryer, E. M., 182
- Fur trade, Washington forts (Sperlin), *bibliogr.*, 457
- Fuscau horaire, *note*, 374, 375

G

- G—, R. O., 370
 Gabrici, L. D., 292
 Gadoud, M., 182
 Gaillard, Gaston, 461

- Galápagos Islands
 Galápagos Islands, The (with map) (McBride), 229-239
 Map from British Admiralty Chart (map), 231
 Galesburg, Mich., topographic sheet, *map*, 519
 Galicia
 Blink, H., *bibliogr.*, 84
 Gallois, Lucien
 Alsace-Lorraine and Europe (with map and ills.), 89-115
 Gallouédec, L., 182
 Gambetta, Léon, 103
 Game. *See* Big game
 Gamio, Manuel
 Forjando patria (pro nacionalismo), *rev.*, 458
 García, Eleodoro, 386, 392
 Garrapata, 500
 Garrison, O., topographic sheet, *map*, 519
 Gascony
 Dunes (Harlé), *bibliogr.*, 182
 Gavarnie, Massif de
 Schrader, F., *bibliogr.*, 183
 Gazaud, Laurent, 182
 Gazert, Hans, 525
 Geddes, Patrick, 515
 Geisler, Ludvig, 218, 227
 Geographical directory, *bibliogr.*, 464
 Geographical news, 77, 176, 288, 375, 454
 Geographical societies. *See* American Geographical Society; Royal Geographical Society
 Géographie Bong. *See* Reclus, Onésime
 Geography
 Central Association of Science and Mathematics Teachers (Mannhardt), *bibliogr.*, 464
 Definition, methodology, etc. (Merino), *bibliogr.*, 464
 Germany, during the war (Rabot), *bibliogr.*, 184
 Population question and (Chisholm), *bibliogr.*, 528
 United States (Chisholm), *bibliogr.*, 464
 Geology and geomorphology
 Balaton, Lake, *bibliogr.*, 84
 Block Mountains in Nelson, N. Z. (Cotton), *bibliogr.*, 382
 Block Mountains in New Zealand (Cotton), *rev.*, 380
 Canadian National Parks (Camsell), *bibliogr.*, 377
 Colorado (Vail), *bibliogr.*, 457
 Colorado, northern (Ziegler), *bibliogr.*, 457
 Columbia River gorge (Williams), *bibliogr.*, 457
 Detroit folio Michigan (Sherzer), *rev.*, 293
 Florida coral reef tract (Vaughan and Shaw), *bibliogr.*, 456
 Galápagos Islands, 232
 Great Plains (Darton), *bibliogr.*, 292
 Iowa, northwestern (Carman), *bibliogr.*, 294
 Geology and geomorphology (*continued*)
 Michigan, surface geology and agricultural conditions of (Leverett), *rev.*, 518
 Minnesota, northeastern (Leverett and Sardeson), *bibliogr.*, 294
 New Zealand, Notocene (Thomson), *bibliogr.*, 383
 New Zealand, The outline of (with map, diagrs., and ills.) (Cotton), 320-340
 Portugal, bibliography (Choffat and Fleury), *bibliogr.*, 523
 Santander bay, Spain (Cereceda), *bibliogr.*, 523
 Sinai, Peninsula of, *note*, 452
 South Victoria Land (Schetelig), *bibliogr.*, 525
 Veglia (Pawlowski), *bibliogr.*, 85
 West Indian fossil corals (Vaughan), *bibliogr.*, 83
 Wisconsin (Alden), *bibliogr.*, 519
 Yunnan (Brown), *bibliogr.*, 88
 Geomorphology. *See* Geology and Geomorphology
 Georgia
 Agrarian revolution in Georgia, The, 1865-1912 (Brooks), *rev.*, 455
 Bladen topographic sheet, *map*, 456
 Georgian Bay, 506
 Gerba, Raimund, 84
 Germain, Louis, 182
 German East Africa
 Future, *note*, 372
 German language in Alsace-Lorraine, 100
 German South Polar Expedition. *See* Antarctic
 Germania Land, Greenland
 Vegetation (Lundager), *bibliogr.*, 296
 Germans
 Austria, 56
 Central Hungary, 424
 Colonization in eastern Europe (with map) (Brunhes and Vallaux), 465-480
See also Hungary
 Germany
 Alsace-Lorraine and, 103
 Bibliography, 184, 462
 Coal, *note*, 175
 Expansion, methods (Hauser), *bibliogr.*, 462
 Geography during the war (Rabot), *bibliogr.*, 184
 Industrial growth and imperialism, 108
 Industrialism, *note*, 450
 North Sea-Black Sea canal project (Rágóczy), *bibliogr.*, 184
 Province Rhénane et la Westphalie: Étude économique (Guyot), *rev.*, 462
 Trade and war (Snow and Kral), *bibliogr.*, 462
See also Alsace-Lorraine; Pangermanism
 Gibbons, H. A.
 The new map of Africa (1900-1916): A history of European colonial expansion and colonial diplomacy, *rev.*, 379
 Gilbert, G. K.
 Obituary, 177

- Giraffe and Masai (ill.), 313
 Giuffrida-Ruggeri, V., 180, 520
 Glaciation
 Iberian Peninsula (Navarro), *bibliogr.*, 523
 Glaciers
 Glacial variations, *note*, 75
 Guadarrama (Obermaier and Carandell), *bibliogr.*, 523
 Monts-Dore (Glangeaud), *bibliogr.*, 182
 Glangeaud, Ph., 182
 Godhavn, 215, 218, 219, 221, 223, 227
 Goiter, 7
 Gomara, F. L. de, on Córdoba's discovery of Yucatan, 444
 Gondwanaland, *note*, 372
 Gorals, 10
 Gordon, Thomas, 365
 Gorges
 Columbia River, geology (Williams), *bibliogr.*, 457
 Mississippi, upper (Martin), *bibliogr.*, 294
 Yangtze River, near Ta-ku ferry (ills.), 3, 17
 Goy, Henri, 464
 Grain
 Canada's routes of export (Rabot), *bibliogr.*, 291
 Orenburg market (Khvorosmanski), *bibliogr.*, 521
 Grand Caicos, 45, 49, 50
 Grand Cairo, 443, 446, 447
 Grand Canyon
 Story of the Grand Canyon of Arizona (Darton), *rev.*, 377
 Grand River, Mich., 509
 Grand Turk Island, 40, 41, 42
 Cockburn Town (ill.), 40
 Salt industry, ponds and shipment (ills.) 43
 Grassland
 New Zealand (Cockayne), *bibliogr.*, 382
 Grassy, Cape, 355, 356
 Gravelius, H., 528
 Gravitation
 Mediterranean Sea (Wolff), *bibliogr.*, 384
 Grazing
 Western ranges and erosion (Sampson and Weyl), *bibliogr.*, 456
 Great Britain
 Industrialism, *note*, 450
 See also British Isles
 Great Inagua Island, 44
 Great Lakes
 Indians, The, of the Great Lakes region and their environment (Parkins), 504-512
 Influence on pressure movements (Cox), *bibliogr.*, 80
 Transportation (Parkins), *bibliogr.*, 292
 Great Plains
 Structure (Darton), *bibliogr.*, 292
 Greco-Serbian treaty, 25
 Greece, 32, 36
 Greenland
 Disko Bay *savssats*, 215
 Greenland (*continued*)
 Över Grönlands Inlandsis: Dagboksblad från "Den första Thule-expeditionen" (Rasmussen), *rev.*, 296
 Rasmussen's work, *note*, 285
 Vegetation of Germania Land (Lundager), *bibliogr.*, 296
 War effects on Eskimo life, *note*, 286
 Greenough, John, 513
 Gregg, W. R., 294
 Grenfell, George, *note*, 75
 Grenoble
 Hydro-electric power, *note*, 451
 Grésivaudan
 Scipione and Pietro, *bibliogr.*, 183
 Gribaudi, Piero, 84
 Griffin, Watson, 82
 Grijalva, 443, 445
 Grinnell, G. B., 517
 Grinnell, J., 457
 Griscorn, Ludlow, 371
 Grizzly Mountain, Idaho, panorama (map), opp. 502
 Guardarrama, Sierra de
 Glaciers, Quaternary (Obermaier and Carandell), *bibliogr.*, 523
 Guatemala
 Earthquake (Morley), *bibliogr.*, 458
 Guéchoff, I. E., 21
 Guianas, The
 Bibliography, 460
 Boat trip in (Verrill), *bibliogr.*, 461
 Guidebooks
 Brittany (Medill), *bibliogr.*, 183
 Canadian National Parks (Camsell), *bibliogr.*, 377
 Gustine, Cal., topographic sheet, *map*, 378
 Gutiérrez-Lanza, Mariano, 82
 Guyot, Yves
 La Province Rhénane et la Westphalie: Étude économique, *rev.*, 462
- ## H
- Hadley, John, 365
 Hail
 Nebraska storm of Aug. 8, 1917, *note*, 174
 Haiti
 Descriptive data, *bibliogr.*, 82
 Hall, Maxwell, 82
 Hann, Julius von
 Die Ergebnisse der meteorologischen Beobachtungen auf dem Sonnewendstein, *rev.*, 83
 Hanna, William J., 5, 7
 Hansen Strait, 357
 Hansen's farthest, 357
 Hapgood, Mrs. Norman, 375
 Harbors. *See* Ports
 Harlé, Édouard, 182
 Harlé, Jacques, 182
 Harper, R. M., 456
 Hartley, G. I., 460
 Harts, W. W., 292
 Harvey, W. H., 188
 Hassel Sound, 359

- "Haunted Isles, The," 229, 234
 Hauser, Henri, 462
 Havana
 Temperature (with graph), 242
 Haworth, P. L., 290
 On the headwaters of the Peace River,
 etc., *rev.*, 376
 Hazard, D. L., 289
 Heat. *See* Temperature
 Heathsville, Virginia-Maryland, topographic
 sheet, *map*, 456
 Hecke, Wilhelm, 84
 Heemskerck, Jacob van, 295
 Hegemony. *See* Social control
 Heller, Edmund, 4, 371 (*note*)
 Geographical barriers, The, to the distri-
 bution of big game animals in Africa
 (with map and ills.), 297-319
 Henderson, J. B., 82
 Henry, A. J., 80
 Herbertson, A. J., 515
 Herbertson, A. J., and O. J. R. Howarth,
 edits.
 Oxford Survey of the British Empire,
 The: Australasia, etc., *rev.*, 380
 Herman (ship), 365, 368
 Hernández, Ignacio, 230
 Herrera, Antonio de, on Córdoba's discovery
 of Yucatan, 444
 Hermann, C. F. von, 456
 Herschel Island, 365, 368
 Heuler, Felix, 383
 Hewett, D. F., 456
 Hickson, J. W. A., 377
 Hidatsa Indians
 Agriculture (Wilson), *bibliogr.*, 295
 Higginsport, O., topographic sheet, *map*, 519
 Hillsboro, Oregon-Washington, topographic
 sheet, *map*, 378
 Hinks, A. R., 71
 Hinojosa, Eduardo de, 463
 Hippopotamus herd on Tana River (ill.), 311
 Historical geography
 Historical geography of Detroit, The
 (Parkins), *rev.*, 519
 Ptolemy's maps of northern Europe
 (Schütte), *rev.*, 519
 Roman Africa (Blessich), *bibliogr.*, 379
 History
 Canada, publications of 1915 (Wrong and
 others), *bibliogr.*, 291
 Compendio de la historia general de
 América (Navarro y Lamarca), *rev.*,
 463
 Illinois in 1818 (Buck), *bibliogr.*, 519
 Journey to the United States in 1793-1798
 (Moreau de Saint-Méry), *bibliogr.*, 292
 Mackinac (Wood), *bibliogr.*, 519
 Minnesota, Polk County (Holcombe and
 Bingham), *bibliogr.*, 294
 Pacific Northwest (Schafer), *bibliogr.*, 456
 United States manufactures (Clark), *bib-*
 liogr., 292
 Virginia frontier (Bushnell), *bibliogr.*, 455
 Weddell Sea (Bruce), *bibliogr.*, 525
 See also Prehistory
 History of geography and exploration
 Reizen van Willem Barents, Jacob van
 Heemskerck . . . (1594-1597) (Naber),
 rev., 295
 United States western exploration, Lewis
 and Ordway journals (Quaife), *bib-*
 liogr., 293
 Hitti, P. K.
 The origins of the Islamic state, *rev.*, 184
 Hobbs, W. H., 375
 Hodge, F. W., 80
 Hoel, Adolf, 374
 Hoffman, F. L., 464
 Holcombe, R. I., 294
 Holdich, T. H., 462
 Holland. *See* Low Countries
 Holway, E. W. D., 377
 Holy Land. *See* Palestine
 Hondius, Henricus, 68
 Hondius, Jodocus, 67
 Honduras
 Geography and statistics (Ramirez F.
 Fontecha), *bibliogr.*, 81
 Hopkins, A. A., 80
 Hopkins, C. G., 294
 Houses
 Finnish, in Minnesota (ill.), 193-195
 Finnish bathhouse (ill.), 210
 Kavirondo hut (ill.), 315
 La Villa, Venezuela, typical native, 491
 (ill.), 492
 Macoa Indians (ills.), 390, 393, 394
 Moso (ill.), 9
 Of boulders, Portugal (ill.), 152
 Schoolhouse in Minnesota (ill.), 208
 Shan village (ill.), 139
 Têng-yueh, China (ill.), 139
 Howarth, O. J. R. *See* Herbertson, A. J.,
 and O. J. R. Howarth
 Howes, P. G., 460
 Hrdlička, Aleš, 80, 84, 464
 New journal, *note*, 289
 Hubbard, G. D., 294
 Hubbard, G. E.
 From the Gulf to Ararat; An expedition
 through Mesopotamia and Kurdistan,
 rev., 184
 Hudson Bay
 Divide from Ungava Bay (ill.), 127
 Northeastern coast (61° N.) (ill.), 125
 Hudson Bay Railway
 Trémaudan, A. H. de, *bibliogr.*, 291
 Huebner, G. G.
 Agricultural commerce: The organization
 of American commerce in agricultural
 commodities, *rev.*, 79
 Hullu, J. de
 Over den Chinaschen handel der Oost-
 Indische Compagnie in de eerste derlig
 jaar van de 18e eeuw, *rev.*, 87
 Human geography
 France, region north of Carcassonne
 (Reverdy), *bibliogr.*, 183
 Regions (Fleure), *bibliogr.*, 180
 See also Anthropogeography; Anthro-
 pology; Ethnology

Humboldt Current, 236, 237

Hungary

Asiatic monsoons (Cholnoky), *bibliogr.*, 84
Bibliography, 84

Central Hungary: Magyars and Germans
(with maps and diagr.) (Wallis), 421-435

Eastern, nationalities (map 2), opp. 168

Eastern, population density (map 3), opp. 168

Eastern, relief (map 1), opp. 168

Effects of the war, 435

Northern, internal migrations (with cartogram), 275

Northern, nationalities (map 2), opp. 280

Northern, population and nationalities, 269

Northern, population density (map 3), opp. 280

Northern, relief (map 1), opp. 280

Rumanians in Hungary, The (with maps and diagrs.) (Wallis), 156-171

Slavs of northern Hungary, The (with maps and diagr.) (Wallis), 268-281

Slavs of southern Hungary, The (with maps and diagr.) (Wallis), 341-353

Southern, nationalities (map 2), opp. 352

Southern, population density (map 3), opp. 352

Southern, population growth (diagr.), 344

Southern, relief (map 1), opp. 352

Statistics compared with Austrian, 53-55

Subject races, 434

West-central, nationalities (map 2), opp. 432

West-central, population density (map 3), opp. 432

West-central, relief (map 1), opp. 432

See also Austria-Hungary

Hunting

Indians of the Great Lakes region, 511

Hurley, Frank, 525

Huron Indians, 505, 509

Hurricanes

Jamaica (Hall), *bibliogr.*, 82

West Indies (Millás y Hernández), *bibliogr.*, 82

Hutchins, D. E., 373

Huts. *See* Houses

Hydro-electric power. *See* Water power

Hydrography

Bibliography, 528

Report on the work carried out by the
S. S. *Scotia*, 1913 (Matthews and
others), *rev.*, 526

I

Iberian Peninsula

Physical relations (Villar), *bibliogr.*, 523

Quaternary glaciation (Navarro), *bibliogr.*, 523

Regionalism (Merino), *bibliogr.*, 523

See also Spain, Portugal

Ice

Antarctic cap (Mather), *bibliogr.*, 525

Disko Bay and *savssats*, 215

Ice (*continued*)

Ice storms (Frankenfield), *bibliogr.*, 80

Spitzbergen conditions, *note*, 374

See also Arctic; Arctic Ocean

Ice Age

Antarctic testimony (Manson), *bibliogr.*, 525

Illinois

Climate (Mosier), *bibliogr.*, 294

In 1818 (Buck), *bibliogr.*, 519

Kings and Kirkland topographic sheets,
maps, 519

Soil investigation, summary (Hopkins and
others), *bibliogr.*, 294

Illinois-Wisconsin

Rockford topographic sheet, *map*, 519

Illiteracy

Austria, 58, 59

Immigration

United States census (Folkmar), *bibliogr.*, 80

Imperialism, German, 465, 466

India

Rainfall (correspondence), 77

Indiana

Sand dunes (Bailey), *bibliogr.*, 294

Indians

American, genesis (Hrdlička), *bibliogr.*, 464

Chippewas (Hrdlička), *bibliogr.*, 80

Colombia and Venezuela tribes, 389

Great Lakes region (Parkins), 504-512

Hidatsas (Wilson), *bibliogr.*, 295

Macoitas (Macoas), *note*, 172

Motilones, 172, 385, 389, 460, 497

Ohio (Shetrone), *bibliogr.*, 295

United States, passing (Mooney), *bibliogr.*, 292

Venezuela, 497

Virginia (Sams), *bibliogr.*, 456

Yana (Waterman), *bibliogr.*, 457

Indo-China. *See* French Indo-China

Industrialism, 411

Divergent development in Britain and
Germany, *note*, 450

Industry

Finns and co-operative, 199

France, *bibliogr.*, 182

Germany (Snow and Kral), *bibliogr.*, 462

Sugar in America, *bibliogr.*, 82

Western Europe (Newbiggin), *bibliogr.*, 462

Inorodetz, 475

Investigator (ship), 363

Iowa

Davenport, weather elements (Udden),
rev., 293

Pleistocene geology of northwestern (Carman), *bibliogr.*, 294

Irague, M., 182

Iran

Bibliography, 86

Migrations before history (Maunder),
bibliogr., 86

Iron

Alsace-Lorraine, *note*, 175

Germany, 113

- Iron (*continued*)
 United States, outlook (Kemp), *bibliogr.*, 292
- Iroquois Indians, 504
- Irrigation
 Alemeitejo (Ferreira), *bibliogr.*, 523
 Chile, *note*, 370
 United States (Newell), *bibliogr.*, 292
 Western United States (Woehlke), *bibliogr.*, 457
- Isachsen, Cape, 359, 360
 Isachsen Land (Island?), 360
- Isère valley
 Scipione and Pietro, *bibliogr.*, 183
- Islam. *See* Turkey in Asia
- Islands, Bay of. *See* Bay of Islands
- Isle of Pines. *See* Pines, Isle of
- Isolation
 Galápagos Islands, 235
- Istria, 52
- Italians
 Austria, 56
 In agriculture in the United States (Gabrici), *bibliogr.*, 292
- Italy
 Arabia and (Presenti), *bibliogr.*, 86
- Itoto
 Name, 386
See also Sierra de Itoto
- Izaleo
 Studies (Peccorini), *bibliogr.*, 81
- ## J
- Jacksonville, East Caicos, 49
- Jamaica
 Hurricanes, earthquakes, etc. (Hall), *bibliogr.*, 82
- James Island, 229, 234
- Janssonius, Joannes, 68
- Jefferson, Mark
 Real temperatures, The, throughout North and South America (with map and diags.), 240-267
 Reply to, from B. C. Wallis, 77
- Jews
 Austria, 56
 Hungary, 157
 Hungary, central, 425
 Hungary, northern, 269
 Hungary, southern, 343
- John Russell Point, 362, 363
- Johnson, D. W.
 Lecture announcement, *note*, 370
- Johnson, G. W., 174
- Johnson, William (fur buyer), 283
- Johnston, H. H., 379
- Journals. *See* History
- Jovanovic, V., 84
- Jugo-Slavs. *See* Yugo-Slavs
- Justice, 110
- ## K
- Kaelin, F. T., 290
- Kakamwega forest, 315 (ill.), 318
- Kalahari Desert, 452
 Flora (Phillips), *bibliogr.*, 463
- Kalevala (Finnish epic), 201
- Karst, 52, 74
- Katz, F. J., 456
- Kavirondos, 312
 Field and hut (ill.), 315
- Kayaks
 Eskimos in (ills.), 130, 131
- Kellett, Cape, 357, 359, 364
- Kelsey, Carl, 528
- Kemp, J. F., 292
- Kentucky
 Killing frosts, *note*, 515
- Kenya, Mt., 314
 Alpine vegetation and bamboo forest (ills.), 317
 Geography, *note*, 372
 Summit peak (Batian) (ill.), 316
- Key West
 Temperature (with graph), 257
- Keys
 Turks and Caicos Islands, 37-51
- Khvorosmanski, P., 521
- Kiaochow
 Schrameier, W., *bibliogr.*, 295
- Kiev, 476
- Kikuyu, 316
- Kilmarnock, Va., topographic sheet, *map*, 456
- King Edward Cove, S. Georgia
 Whaling station (with ill.), *note*, 287, 288
- Kings, Ill., topographic sheet, *map*, 519
- Kirkland, Ill., topographic sheet, *map*, 519
- Ki-Swahili, 304
- Kleist, G.
 Drawing of *savssat* (with ill.), 221, 227
- Knight, A. L., 359
- Knobel, F. M., 86
- Koch, Lauge, *note*, 286
- Koksoak River
 Fort Chimo and (ill.), 125
- Kolb, George, 373
- Kral, J. J., 462
- Krasnaya Polyana (Pasternatzki), *bibliogr.*, 521
- Krausz, H. B., 173, 174
- Kriva River
 Upper valley (ill.), 27
- Kullmer, C. J., 292
- Kunst, John, 229
- Kunz, G. F., 450
- Kurdistan
 From the Gulf to Ararat (Hubbard), *rev.* 184
- Küstenland, 52
- ## L
- Labrador. *See* Ungava Peninsula
- La Gé River, 483, 499
 Aspect (ill.), 484
- La Horqueta, Venezuela, 495
 Region north, 499
- La Joya, Peru
 Temperature (with graph), 246
- Lakes
 Maracaibo lowland, western, typical (with ill.), 493
 Meteorological influences (Miller), *bibliogr.*, 292

- Lamy, Étienne, 86
 Landry, Adolphe, 182
 Langhans, P., 182
 Langton, H. H., 291
 Languages
 German in Alsace-Lorraine, 100
 Ki-Swahili, 304
 Russia and Austria-Hungary (Meillet),
 bibliogr., 462
 Languedoc
 Military towns in 18th century (X.), *bibliogr.*, 183
 Lansing, Robert, 374
 Lapland
 Parmentier, Georges, *bibliogr.*, 181
 La Quebrada, Venezuela, 499
 Pasture land near (ill.), 499
 Larsen, C. A., *note*, 288
 Larson, O. J., 185
 Las Casas, Bartolomé de, on Córdoba's discovery of Yucatan, 459
 Latin America. *See* Central America; South America
 Laurens, Hippolyte, 183
 Laurie Island, S. Orkneys
 Observations (Davis), *bibliogr.*, 525
 Temperature (with graph), 256
 Lausanne
 Study in city geography, *note*, 285
 Laut, A. C., 290
 La Villa, Venezuela, 387, 388, 389, 483, 491
 Houses, typical native (ill.), 491
 Plain near (ill.), 482
 Street (ill.), 490
 Lawler, James, 290
 Lawtey, Fla., topographic sheet, *map*, 456
 Leaf Gulf, 122, 123
 Leaf River, 116, 120
 On the upper (ill.), 122
 Preparing for camp (ill.), 121
 Lecuna, Vicente, 461
 Leeward Islands
 Meaning of term, *note*, 71-73
 Legendre, A. F., 88
 Leidigh, A. H., 173
 Leith Harbour, S. Georgia
 Whale factory (ill.), 287
 Lenecwicz, Stanislas, *note*, 74
 Leong, Y. K., 88
 Leonidas, Mich., topographic sheet, *map*, 519
 Le Plongeon, Augustus, 446
 Le Prince, J. A., 458
 Leribo Plateau, South Africa
 Flora (Phillips), *bibliogr.*, 463
 Levant
 France in (Lamy), *bibliogr.*, 86
 Leverett, Frank, 294
 Surface geology and agricultural conditions of Michigan, *rev.*, 518
 Lewin, Evans, 290, 379
 Lewis, F. J., 290
 Lewis, Meriwether
 Journal (Quaife), *bibliogr.*, 293
 Lewis, R. G., 290
 Leyland, John, 528
 Libby, O. G., *note*, 284
 Libertad. *See* Machiques
 Liberty, Hungarian vs. British, 433
 Li-chiang fu, 8
 Moso house near (ill.), 9
 Liddon Gulf, 355
 Lièvre, D., 379
 Lignite, 108
 France, west coast (Welsch), *bibliogr.*, 183
 Lisbon, 154
 Fishing smacks (ill.), 151
 Lithuania, 474
 Little Russians. *See* Ukraine
 Live stock
 Austria, 62-63
 Central American countries (Sandberg),
 bibliogr., 81
 Livonia, 469
 Map, 522
 Livonian Knights
 Baltic Provinces and, 471
 Llanuces, Cantabrian Mountains
 Torner, F. M., *bibliogr.*, 523
 Lleras, J. A., 460
 Lóczy de Lócz, Louis, 84
 Lodève
 Region (Vigié), *bibliogr.*, 183
 Logan Creek, Cal., topographic sheet, *map*, 378
 London, Treaty of (Tamaro), *bibliogr.*, 521
 Longonot, Mt.
 View showing (ill.), 300
 Longstaff, Mt.
 Explorations in region (Holway), *bibliogr.*, 377
 Lookout stations, A combined map and panorama for orientation from (with map and ills.) (Fritz), 501-503
 López, Elpidio, 458
 Lord Howe Island
 Vegetation (Oliver), *bibliogr.*, 382
 Lorraine. *See* Alsace-Lorraine
 Louderback, G. D., 457
 Loveland, G. A., 174
 Low Countries
 Dutch cartographers of the seventeenth century (Cross), 66-70
 Lower California
 Geography and statistics, *bibliogr.*, 81
 Lumber. *See* Forests; Timber; Trees
 Lumbier, M. M., 458
 Lundager, Andr., 296
 Lung-ling, 144
 Lützelburg (ill.), 90
 Lutzus, 16
 Lyde, L. W.
 Europe v. Middle Europe, *rev.*, 178
 Lyons
 Silk manufacture (Raveneau), *bibliogr.*, 183
 Lyttelton, N. Z.
 Harbor, 335, 337, 338 (diagr.)

M

- McBride, G. M.
 The Galápagos Islands (with map), 229-239

- MacCaughey, Vaughan, 375
 Macclenny, Florida-Georgia, topographic sheet, *map*, 456
 McClure (Arctic explorer), 362, 363
 McCulloh, Walter
 Conservation of water, *rev.*, 292
 Macedonia, 21, 25, 26
 Balkans, The, Macedonia, and the war (with map and ill.) (Woods), 19-36
 Future, 34
 McEwen, G. F., 176
 Macfarlane, C. W., 461
 Macfarlane, J. J., 464
 Machiques, Venezuela, 387, 389, 391, 392, 483, 484, 485, 495
 Country south of, 497
 Description, 496
 Outskirts (ill.), 494
 Mackenzie delta
 Fall of meteor, *note*, 282
 Mackinac
 History (Wood), *bibliogr.*, 519
 Mackinder, H. J., 180
 McLean, F. T., 456
 MacMillan, D. B.
 Arctic exploration and route, recent (map, revised), opp. 368
 Macoa Indians, 389, 393, 394, 395, 408 (ill.), 410
 Huts (ills.), 390, 393, 394
 Status, 396
 Macoita Indians, *note*, 172
 Macoita River, 172 (*note*), 396, 497
 Aspect (ill.), 485
 Falls (ills.), 397, 398, 399
 Macpherson (ship), 365, 368
 Magdalena River, 386
 Mouth improvements (Triana), *bibliogr.*, 461
 Magrini, Giovanni, 517
 Magyaria, 421
 Magyarization, 275, 281
 Magyars
 Anomaly, 433
 Hungary, 157
 Hungary, central, 426
 Hungary, northern, 269
 Hungary, southern, 343
 Mentality of the bureaucracy, 431
 See also Hungary
 Maige-Lefournier, Mathilde, 183
 Malaria
 Eradication in western hemisphere (Hoffman), *bibliogr.*, 464
 Panama and Cuba (LePrince and Orenstein), *bibliogr.*, 458
 Ma-li-ling, 142
 Ma-li-pa, 143
 Mallet, Bernard, 435
 Mamen, Cape, 356, 357
 Man. *See* Anthropology; Diversity; Human geography
 Manganese
 Virginia (Hewett and others), *bibliogr.*, 456
 Manitoba
 Water power (Mitchell), *bibliogr.*, 290
 Manitoulin Island, 506
 Mannhardt, M. C., 464
 Mansfield, G. R., 292
 Manson, Marsden, 525
 Manufactures
 Detroit, *bibliogr.*, 294
 United States, history (Clark), *bibliogr.*, 292
 Mappemondes, 66
 Maps. *See* Cartography; Panorama
 Maracaibo (city), 385, 481, 483, 486
 Maracaibo (province)
 Western Maracaibo lowland, The, Venezuela (with map and ill.) (Booy), 481-500
 Maracaibo, Lake, 481
 Marinelli, Olinto, 288 (*note*), 528
 Marne-Rhine Canal, 106, 114
 Highest point (Lützelburg) (ill.), 90
 Marr, N. J., 521
 Márquez, C. C., 460
 Marshfield, Ore.
 Temperature (with graph), 262
 Martin, Chester
 Lord Selkirk's work in Canada, *rev.*, 290
 Martin, Lawrence, 176, 294
 Martínez, N. G., 229
 Martonne, Emmanuel de, 73 (*note*), 454
 Marvin, F. S., 461
 Mary Sachs (ship), 364
 Maryland
 Climate and plant growth (McLean), *bibliogr.*, 456
 Forests (Besley), *bibliogr.*, 455
 Masai, 312, 313 (ill.)
 Masaryk, T. G., 461
 Massart, Jean, 183
 Massik, Gustav, 364, 365
 Massip, Salvador, 289
 Masterman, E. W. G., 86
 Mathematical geography
 Daylight saving, *note*, 449
 Standard time at sea, *note*, 374
 See also Cartography; Surveying
 Mather, K. F., 525
 Mathews, Va., topographic sheet, *map*, 456
 Matthews, D. J., G. I. Taylor, and L. R. Crawshaw
 Report on the work carried out by the S. S. *Scotia*, 1913, *rev.*, 526
 Maumee River, 509
 Maunder, A. S. D., 86
 Maurienne
 Movement of population (Folliasson), *bibliogr.*, 182
 Mecking, L., 523
 Medill, Robert, 183
 Mediterranean Sea
 Climate province, limit (Toniolo), *bibliogr.*, 181
 England in the Mediterranean, etc. (Corbett), *rev.*, 383
 Gravitation and the Pratt hypothesis (Wolff), *bibliogr.*, 384

- Mediterranean Sea (*continued*)
 Meteorological charts, *maps*, 384
 Spanish oceanographic work, *note*, 516
 Meillet, A., 462
 Meinardus, W., 523
 Mekong River, 15, 16
 Geology (Brown), *bibliogr.*, 88
 Salween divide (ill.), 13
 Southwest of Wei-hsi (ills.), 12
 Unmapped country between the Mekong and Ta-li fu (ill.), 17
 Melville Island, 354-356, 361, 362
 Mêng-ting, 138
 Market day, 140, 141, 143
 Mercado, Jorge, 460
 Mercanton, P. L., *note*, 76
 Mercator, Gerardus, 66, 67
 Merino, Abelardo, 464, 523
 Meru village (ill.), 313
 Mesopotamia
 French influence (Dolot), *bibliogr.*, 86
 From the Gulf to Ararat (Hubbard), *rev.*, 184
 Future (Willcocks), *bibliogr.*, 87
 Knobel, F. M., *bibliogr.*, 86
 Meteor in northern Canada, *note*, 283
 Meteorology
 Agricultural, *note*, 77
 Agricultural (Smith), *bibliogr.*, 293
 Amundsen's Antaretic Expedition (Mohn), *rev.*, 524
 Antarctic (Ault; Davis), *bibliogr.*, 525
 Australian rainfall maps, *note*, 373
 Aviation and, in Australia, *note*, 175
 Canadian Rockies (Wheeler), *bibliogr.*, 377
 China (Brooks), *bibliogr.*, 88
 Chinese coast, notes (Dines), *bibliogr.*, 88
 Colombia (Lleras), *bibliogr.*, 460
 Deutsche Südpolar Expedition, 1901-1903, von Drygalski, etc., *rev.*, 523
 Donnersberg (Spitaler), *bibliogr.*, 85
 Lakes, influences (Miller), *bibliogr.*, 292
 Mediterranean Basin, *maps*, 384
 "Nortes" in Mexico (López), *bibliogr.*, 458
 "Northers" of the Panama Canal region, *note*, 73
 Russian farmers, "dryness" charts for, *bibliogr.*, 522
 Schematische Karten der Wahrscheinlichkeit des Auftretens der trockenen Dekaden (Brounow), *rev.*, 521
 Sonnwendstein (Hann), *rev.*, 83
 Venezuela (Ugueto), *bibliogr.*, 461
 War and, *note*, 517
See also Climatology; Rainfall; Storms; U. S. Weather Bureau; Weather
 Methorst, H. W., 520
 Metz, 93, 95
 French character, 97
 Inner part showing Moselle and cathedral (ill.), 99
 Mexico
 Bibliography, 80, 458
 Mexico (*continued*)
 Geographical provinces and minerals (Ordóñez), *bibliogr.*, 80
 Geography and statistics, *bibliogr.*, 81
 "Nortes" (López), *bibliogr.*, 458
 Physiography (Thayer), *bibliogr.*, 81
 Salt industry (Zarate), *bibliogr.*, 81
 Seismology to 1917 (Lumbier), *bibliogr.*, 458
 Social life, Bandelier's work (Waterman), *bibliogr.*, 81
 Meyer, F. N., 88
 Miami Indians, 509
 Michigan
 Battle Creek, Galesburg, Leonidas, and Union City topographic sheets, *maps*, 519
 Detroit folio (Sherzer), *rev.*, 293
 Indian tribes, 508, 509
 Surface geology and agricultural conditions of Michigan (Leverett), *rev.*, 518
 Michilimackinae, 511
 Middle Europe. *See under* Europe
 Middle West. *See under* United States
 Migration
 Austria, 57, 58, 60
 Caucasus region (Marr), *bibliogr.*, 521
 Hungary, northern (with cartogram), 275
 Hungary, southern (with cartogram), 346
 Hungary, west-central (with cartogram), 427, 428
 Iran, prehistoric (Maunder), *bibliogr.*, 86
 Seasonal, *note*, 73
 Milford Sound, N. Z.
 Looking up (ill.), 339
 Military geography
 Arabia (Presenti), *bibliogr.*, 86
 Colombia (Mercado), *bibliogr.*, 460
 Millás y Hernández, J. C., 82
 Miller, E. R., 292, 514
 Miller, L. E., 460
 Millot, Stanislas, 88
 Millsboro, Del., topographic sheet, *map*, 456
 Mims, S. L., 292
 Minerals
 Alsace-Lorraine, 107, 175 (*note*)
 Mexico (Ordóñez), *bibliogr.*, 80
 Mining
 Coal in China (Reed), *bibliogr.*, 295
 Finns, 188
 Minnesota
 Brainerd topographic sheet, *map*, 519
 Finland compared with northeastern, 195
 Finn distribution in relation to forest (map), 204
 Finnish towns, distribution in St. Louis County (map), 197
 Finns in northeastern, 185
 Forest fire, *note*, 513
 Map of forest fire (map), 514
 Polk County, history and biography (Holcombe and Bingham), *bibliogr.*, 294
 Surface formations of northeastern (Leverett and Sardeson), *bibliogr.*, 294
 Minto, Lake, 116, 119
 Dwarf trees near (ill.), 121
 Western end (ill.), 123

- Miser, H. D., 456
 Mississippi Basin
 Transportation on rivers (Parkins), *bibliogr.*, 292
 Mississippi River
 Gorge of upper (Martin), *bibliogr.*, 294
 Mistral
 Note on (Gazaud), *bibliogr.*, 182
 Mitchell, P. H., 290
 Mittel Europa, 114
 Chisholm, G. G., *bibliogr.*, 180
 Moa, extinction (Downes), *bibliogr.*, 382
 Mocaër, Pierre, 183
 Mödling
 Jovanovic, V., *bibliogr.*, 84
 Mohr, H., 525
 Meteorology (Roald Amundsen's Antarctic Expedition), *rev.*, 524
 Mollendo
 Temperature (with graph), 243
 Mömpelgard. *See* Montbéliard
 Monastir, 25, 32
 General view (ill.), 22
 Street (ill.), 30
 Monkeys, killing, 408
 Monsoon
 Asiatic in Europe (Cholnoky), *bibliogr.*, 84
 India (letter from B. C. Wallis in reply to M. Jefferson), 77
 Montbéliard
 Langhans, P., *bibliogr.*, 182
 Monte Verde, Venezuela, 488, 490
 Montessus de Ballore, F. de, 86, 464
 Mont-Perdu
 Schrader, F., *bibliogr.*, 183
 Monts-Dore
 Glaciers (Glangeaud), *bibliogr.*, 182
 Mooney, James, 292
 Moorcroft, Wyo., topographic sheet, *map*, 378
 Moore, E. S., 382
 Morava valley, 29
 Moravia, 53
 Moreau de Saint-Méry, M. L. E., 292
 Morley, S. G., 458
 Morosoff (Popoff), E., 521
 Morton, B. R., 290
 Mörzer Bruyns, A. G., 82
 Moselle, Côtes de, 91, 93, 95, 104
 View (ill.), 105
 Moselle River, 92, 95
 Valley above Metz (ill.), 105
 Mosier, J. G., 294
 Mosos, 8, 9
 House (ill.), 9
 Individual (ill.), 10
 Mosquito control. *See* Malaria
 Mossman, R. C., 289, 370, 525, 526
 Motilone Indians, 172, 385, 389, 460, 497
 Moulton, H. G.
 Waterways versus railways, *rev.*, 79
 Mount. *See* name of mountain
 Mt. Riley, N. M., topographic sheet, *map*, 378
 Mountaineering
 British Columbia (Holway; Stone), *bibliogr.*, 377
 Southern Europe and northern Africa (Täuber), *bibliogr.*, 384
 Mountains
 Block mountains.... in Nelson, N. Z. (Cotton), *bibliogr.*, 382
 Block mountains in New Zealand (Cotton), *rev.*, 380
 Kenya, *note*, 372
 Tibeto-Chinese massif (Legendre), *bibliogr.*, 88
 Moyssset, Henri, 474
 Muir, Ramsay, 520
 Mujeres Island, 443, 447, 448
 Mülhausen (Mulhouse), 97, 98, 104, 106
 Potash, *note*, 175
 Muller, Hendrik, 88
 Murphy, L. S., 83
 Murphy, R. C., 288
 Muscovy, 469, 475
 Musoni, F., 84
 Muzo, Colombia
 Valley of emeralds (Pogue), *bibliogr.*, 461
 Mythology
 Finns, 200
- ## N
- Naber, S. P. L'Honoré
 Reizen van Willem Barents, Jacob van Heemskerck . . . (1594-1597), *rev.*, 295
 Names. *See* Place names
 Nam-lu (Shan village) (ill.), 139
 Camp, 142
 Nam-ting River
 Valley and jungle, 141
 View (ill.), 137
 Nancy, 108
 Narwhals
 Crowding at holes in ice, 215
 Killing and flensing (with ill.), 219-221
 Male and female (ills.), 225
 Tusks and their use (with ill.), 215, 226, 227
 National Council of Geography Teachers, aims and work (Whitbeck), *bibliogr.*, 464
 National forests. *See under* Forests
 National parks. *See under* Parks
 Nationality
 Austria, 55, 57, 64
 Austria (map), Pl. III opp. p. 64
 Balkans, 34, 35
 Canada (Laut), *bibliogr.*, 290
 Hungary, central, 424
 Hungary, northern, 270
 Hungary, southern, 343
 Nationality and the war (Toynbee), *rev.*, 179
 Pan-Germanism and small nations (Masaryk), *bibliogr.*, 461
 Suppression, 411
 Western Europe, *note*, 515
 See also Races

- Naumann, Friedrich, 451
 Navarro, L. F., 523
 Navarro y Lamarea, Carlos
 Compendio de la historia general de América, rev., 463
 Navigation
 Spanish American (Consciencia), *bibliogr.*, 463
 Near East, 19, 21
 Nebraska
 Hailstorm of Aug. 8, 1917, *note*, 174
 Potash industry (Condra), *bibliogr.*, 294
 Nelson, N. Z.
 Block mountains (Cotton), *bibliogr.*, 382
 Nelson Haven, N. Z., 333
 Boulder Bank, 333, 334 (ill.)
 Nêophytus, Frère, 86
 Nero, Monte
 Musoni, F., *bibliogr.*, 84
 Neshkoro, Wis., topographic sheet, *map*, 519
 New Brunswick
 Water power (Smith), *bibliogr.*, 290
 New Effington, South Dakota-North Dakota, topographic sheet, *map*, 519
 New Mexico
 Camel Mountain, Mt. Riley, Noria, and Reserve topographic sheets, *maps*, 378
 New Orleans
 Temperature (with graph), 265, 266
 New York (City)
 Temperature (with graph), 254
 New York Mills, Minn., 204
 New Zealand
 Bibliography, 382
 Block mountains in Nelson (Cotton), *bibliogr.*, 382
 Block mountains in New Zealand (Cotton), *rev.*, 380
 Buried forest (Speight), *bibliogr.*, 383
 Forestry in the Dominion of New Zealand (Schlich), *rev.*, 381
 Geology (Cotton; Thomson), *bibliogr.*, 382, 383
 Grassland (Cockayne), *bibliogr.*, 382
 North and South islands and Cook Strait (map), 321
 Outline, The, of New Zealand (with map, diags., and ills.) (Cotton), 320-340
 Soil survey (Wild), *bibliogr.*, 383
 Vegetation, *bibliogr.*, 382
 Volcanoes (Moore), *bibliogr.*, 382
 Newbiggin, Marion I., 450, 462
 Origin and maintenance, The, of diversity in man, 411-420
 Newell, F. H., 292
 News. *See* Geographical news
 Nicaragua
 Descriptive data, *bibliogr.*, 80
 Scenery (Wright), *bibliogr.*, 458
 Nichols, J. T., 371
 Nicholson, Port. *See* Port Nicholson
 Niederle, Lubor, 180
 Nihlén, Axel, 296
 Nile
 As barrier to big game, 310
 Nyika, 309
 Noice, Harold, 359
 Nombre de Dios harbor, Panama, *map*, 458
 Noria, N. M., topographic sheet, *map*, 378
 North America. *See* Americas
 North Caicos, 45, 46, 50
 North-Central States
 Bibliography, 294, 519
 North Star (ship), 365
 North Star Bay, *note*, 285, 286
 "Northers," Canal Zone, *note*, 73
 Northland Country Club, *note*, 513
 Northwest, The
 History (Schafer), *bibliogr.*, 456
 Northwest Passage, 362, 363
 Nos, Chile, *note*, 370
 Notocene, term (Thomson), *bibliogr.*, 383
 Nova Scotia
 Water power (Smith), *bibliogr.*, 290
 Nyasaland, *note*, 372
 Nyika, 305, 309
 Dry river (ill.), 315
- O
- Oamaru, N. Z., 337
 Obermaier, Hugo, 523
 Obituary
 Bancroft, H. H., 77
 Deniker, Joseph, 177
 Gilbert, G. K., 177
 Vidal de la Blache, Paul, 77
 Ocaña. *See* Sierra de Ocaña
 Oceanography
 Bibliography, 528
 Recent advances (Bruce), *bibliogr.*, 528
 Report on the work carried out by the S.S. *Scotia*, 1913 (Matthews and others), 526
 Spanish work, *note*, 516
 Oceans
 Time zones, *note*, 374
 Ogg, F. A.
 Economic development of modern Europe, *rev.*, 178
 Ogilvie, A. G., *note*, 76
 Ohio
 Bainbridge, Camp Sherman, Garrison, and Higginsport topographic sheets, *maps*, 519
 Indians (Shetrone), *bibliogr.*, 295
 Oil, mineral. *See* Petroleum
 Olive tree
 Limit and Mediterranean climate (Tonio), *bibliogr.*, 181
 Olivecrona, G. W., 88
 Oliver, W. R. B., 382
 Oliver Iron Mining Co., 188
 Olmstead, A. T., 86
 Olsen, Hendrik, *note*, 286
 Omarolluk (Eskimo); 124
 Portrait, 128
 Ontario
 Water power (Acres), *bibliogr.*, 290
 Opium trade, 140
 Ordóñez, E., 80
 Ordway, John
 Journal (Quaife), *bibliogr.*, 293

- Oregon
 Scenery in Cascade Range (Williams), *bibliogr.*, 457
- Oregon-Washington
 Hillsboro topographic sheet, *map*, 378
- Orenburg
 Grain market (Khvorosmanski), *bibliogr.*, 521
- Orenstein, A. J., 458
- Orientation. *See* Lookout stations
- Oroz-Betelu, Pyrenees Mountains
 Urabayan, L. J., *bibliogr.*, 523
- Ortelius, Abraham, 66
- Otago, N. Z., 337
 Peninsula (diagr.), 339
- Ottawa Indians, 506
- Oviedo y Valdes, G. F. de, on Córdoba's
 discovery of Yucatan, 444
- Oxcart in Portugal (ill.), 149
- Oxford Survey. *See* Australasia
- P**
- Pace, Biagio, 86
- Paekakariki, N. Z.
 Cliffs (ill.), 332
 Fans (ill.), 335
- Palestine
 Fifty years' work in the Holy Land: A
 record and a summary, 1865-1915 (Wat-
 son), *rev.*, 85
 Prehistory (Nêophytus), *bibliogr.*, 86
 Suitability for colonization (Masterman),
bibliogr., 86
 Turks in (Aaronsohn), *bibliogr.*, 86
- Palmar River, 387, 388, 483, 490
 Ferry (ill.), 489
- Palmer, Howard, 377
- Palo, Minn.
 Oat crop on Finnish farm (ill.), 199
- Panama
 Descriptive data, *bibliogr.*, 81
 Malaria and yellow fever (Le Prince and
 Orenstein), *bibliogr.*, 458
 Nombre de Dios harbor, *map*, 458
 Railway (Chiriqui), *bibliogr.*, 81
- Panama (city)
 Temperature (with graph), 241
- Panama Canal, 239
 Report, *bibliogr.*, 81
See also Canal Zone
- Panda, 8
- Pan-Germanism, 466, 480
 Masaryk, T. G., *bibliogr.*, 461
 Thierry, René, *bibliogr.*, 380
- Pangolin, 8
- Pankiewicz, Iwan, 521
- Panorama, A combined map and, for orien-
 tation from lookout stations (with map
 and ills.) (Fritz), 501-503
- Panoramic camera, *note*, 71
- Parkins, A. E., 292
 Historical geography of Detroit, The, *rev.*,
 519
 Indians, The, of the Great Lakes region
 and their environment, 504-512
- Parkman, Francis, 284
- Parks
 Canadian National, geology (Camsell),
bibliogr., 377
 National Parks portfolio (Yard), *bib-
 liogr.*, 457
 Rocky Mountains Park, Canada, vegeta-
 tion (Lewis), *bibliogr.*, 290
- Parmentier, Georges, 181
- Paso de la Candelaria, Venezuela, 490, 491
 Ferry (ill.), 489
- Pasternatzki, V., 521
- Patriotism
 Alsace-Lorraine, 102
- Pawlowski, Stanislaw (Stanislaus), 84, 85,
 181
- Payne Bay, 126
- Payne River, 124, 127
- Peace
 Economic basis (Macfarlane), *bibliogr.*,
 461
- Peace River
 On the headwaters of the Peace River
 (Haworth), *rev.*, 376
- Pearl Islands, Panama
 Wicker, C. F., *bibliogr.*, 81
- Peccorini, Atilio, 81
- Peking
 April, 1901 (Milot), *bibliogr.*, 88
- Peñaranda, Manuel, 393, 401
- Perijá (town). *See* La Villa
- Perijá, District of, 483
 Drawback to travel, 499
See also Sierra de Perijá
- Periodicals
Bulletin of the American Geographical
 Society, index, *note*, 172
 Physical anthropology, new American pub-
 lication, *note*, 289
- Personal, 176, 289, 375, 454, 517
- Peru
 Temperature of highland stations, 246
- Petroleum
 Pechelbronn, *note*, 175
- Philip, George, 384
- Philippson, Alfred
 Der französisch-belgische Kriegsschau-
 platz, *rev.*, 179
- Phoenix, Ariz.
 Temperature (with graph), 263
- Phosphate
 United States, resources (Mansfield, *bib-
 liogr.*, 292
- Physical anthropology. *See* Anthropology
- Physical geography
 Iberian Peninsula (Villar), *bibliogr.*, 523
 Washington (Saunders), *bibliogr.*, 456
See also Climatology; Geology and geo-
 morphology; Hydrography; Meteorol-
 ogy; Oceanography; Phytogeography;
 Zoogeography
- Physiography
 Mexico (Thayer), *bibliogr.*, 81
 New Zealand, various districts (Speight),
bibliogr., 383
 Skykomish Basin (Smith), *bibliogr.*, 457
See also Geology and geomorphology

Phytogeography

- Africa, *note*, 371
- Africa (Engler), *bibliogr.*, 379
- Canterbury College Mountain Biological Station (Cockayne and Foweraker), *bibliogr.*, 382
- Galápagos Islands, 234, 236
- New Zealand "age and area" hypothesis (Sinnott), *bibliogr.*, 382
- Riviera, French (Massart), *bibliogr.*, 183
- Piénines (Pieninen)
- Morphology (Pawłowski), *bibliogr.*, 84
- Pietro, Ago, 183
- Piggott, F. T., 528
- Piltz, Erasme, 181
- Pines, Isle of
 - Birds (Todd), *bibliogr.*, 83
- Ping Hsiang colliery, China
- Mining methods (Reed), *bibliogr.*, 295
- Pinhão
 - Terraces for vines (ill.), 149
- Piscator. *See* Visscher
- Place names
 - Austria (Hecke), *bibliogr.*, 84
 - Polish (Pawłowski), *bibliogr.*, 181
 - Venezia Giulia (Musoni), *bibliogr.*, 84
 - Venezuela, changes, 492, 496
- Planada, Cal., topographic sheet, *map*, 378
- Plane table, *note*, 71
- Plants
 - China (Meyer), *bibliogr.*, 88
 - Colorado abandoned roads (Shantz), *bibliogr.*, 456
 - Food plants of ancient America (Safford), *bibliogr.*, 384
 - Maryland, climatic factors (McLean), *bibliogr.*, 456
 - Plant ecology, The, of the Drakensberg Range (Bews), *rev.*, 462
 - See also* Phytogeography
- Pogue, J. E., 293, 461
- Pola
 - Astori, B., *bibliogr.*, 84
- Poland
 - As economic unit (Posner), *bibliogr.*, 181
 - Encyclopaedia (Piltz), *bibliogr.*, 181
 - Geographic bases (Ricchieri), *bibliogr.*, 181
 - Names (Pawłowski), *bibliogr.*, 181
 - Resistance to German domination, 474
- Polar Bear (ship), 354-357, 364, 369
- Polar regions. *See* Arctic; etc.
- Poles
 - Austria, 56
- Political geography
 - Early Babylonia (Olmstead), *bibliogr.*, 86
 - Philips' Record Atlas (Philip), *maps*, 384
- Population
 - Agglomerations (Vidal de la Blache), *bibliogr.*, 528
 - Alsace-Lorraine, evolution (Blache), *bibliogr.*, 184
 - America, modern (Boas), *bibliogr.*, 463
 - Austria, 55, 57
 - Austria (with maps) (Wallis), 52-65
 - Austria, density (map), Pl. I, opp. p. 64

Population (*continued*)

- Baltic Provinces, 469
- Consequences of the war (Gaillard), *bibliogr.*, 461
- Economic types of Italian and American cities (Marinelli), *bibliogr.*, 528
- European movements (Methorst), *bibliogr.*, 520
- Geography and (Chisholm), *bibliogr.*, 528
- Hungary, 158, 162
- Hungary, central, 421
- Hungary, density in eastern (map), Pl. X opp. p. 168
- Hungary, northern, 268
- Hungary, southern, growth (diagr.), 345
- Maurienne, 19th century (Folliasson), *bibliogr.*, 182
- Portugal, 150
- Rumanian Hungary, 157, 159, 165
- Slavs of southern Hungary, 341, 342
- Ukraine, 476
- Porras, Belisario, 81
- Porsild, M. P.
 - On *savssats*: a crowding of Arctic animals at holes in the sea ice (with map and ill.), 215-228
- Port. *See* Wine industry
- Port Nicholson, N. Z., 329
 - Young depressed coast (ill.), 333
- Porto Rico
 - Forests (Murphy), *bibliogr.*, 83
 - Progress (Mörzer Bruyns), *bibliogr.*, 82
 - Social problems (Fleagle), *bibliogr.*, 82
- Ports
 - Nombre de Dios, Panama, *map*, 458
 - Trieste (Gribaudo), *bibliogr.*, 84
- Portugal
 - Bibliography, 523
 - Cartography (Vasconcellos), *bibliogr.*, 523
 - Geology, bibliography of (Choffat and Fleury), *bibliogr.*, 523
 - Portugal: the country and the people (with ill.) (Thompson), 147-155
 - See also* Iberian Peninsula
- Posnanski, M., 521, 522
- Posner, Stanislaw, 181
- Post Office Bay, 230, 231
- Potash
 - Alsace-Lorraine, 107
 - Mülhausen, *note*, 175
 - Nebraska industry (Condra), *bibliogr.*, 294
- Potawatomi Indians, 508, 509
- Povungnituk River, 130
 - Fall 35 feet high (ill.), 125
- Power. *See* Water power
- Pratt hypothesis (Wolff), *bibliogr.*, 384
- Precipitation. *See* Rainfall
- Prehistory
 - Early Babylonia (Olmstead), *bibliogr.*, 86
 - Europe (Giuffrida-Ruggeri), *bibliogr.*, 520
 - Syria and Palestine (Nêophytus), *bibliogr.*, 86
 - Venezia Giulia (Cumin), *bibliogr.*, 84
 - See also* Archeology
- Presenti, Gustavo, 86

- Pressure. *See* Atmospheric pressure
 Prince Edward Island
 Water power (Smith), *bibliogr.*, 290
 Production
 Coal in China (Reed), *bibliogr.*, 295
 Coal in the United States (Erskine), *bibliogr.*, 292
 See also Agriculture; Forestry; Minerals; etc.
 Providenciales Island, 48, 50
 Prussia
 Rhine provinces, 111
 Ptolemy
 North and middle Europe maps (Schütte), *bibliogr.*, 181
 Ptolemy's maps of northern Europe (Schütte), *rev.*, 519
 Pueblo, Col.
 Pathbreakers and pioneers in the Pueblo region, etc. (Whittaker), *rev.*, 377
 Pueblo Viejo, Venezuela (with ill.), 498
 Purcell Range
 Climbs and explorations (Stone), *bibliogr.*, 377
 Purssell, U. G., 294

Q

- Quaife, M. M., 293
 Quebec
 De Québec à Valparaiso (Goy), *bibliogr.*, 464
 Quebec (province)
 Water power (Kaelin), *bibliogr.*, 290
 Queen Charlotte Sound, N. Z. (ill.), 336
 Quelle, O., *note*, 73
 Quinet, Edgar, 480
 Quintas, 148
 Douro River (ill.), 149

R

- Rabot, Charles, 76 (*note*), 181, 184, 291
 Races
 Asia Minor (Ramsay), *rev.*, 85
 Forjando patria (pro nacionalismo) (Gamio), *rev.*, 458
 Old white Americans (Hrdlička), *bibliogr.*, 80
 Region and (Wilson), *bibliogr.*, 181
 Slavs (Niederle), *bibliogr.*, 180
 Subject races in Austria, 63
 Subject races in Hungary, 156
 See also Ethnology; Slavs
 Raeburn, Harold, 87
 Rágóczy, Egon, 184
 Railroads
 Africa (Lewin; Torino y Roldán), *bibliogr.*, 379, 380
 Bagdad Railway (Woods), *bibliogr.*, 87
 Hudson Bay Railway (Trémaudan), *bibliogr.*, 291
 Panama, narrow gauge (Chiriqui), *bibliogr.*, 81
 Vardar valley, 29, 33 (ill.)
 Waterways versus railways (Moulton), *rev.*, 79

- Railroads (*continued*)
 World (Protheroe), *rev.*, 528
 Yunnan, 4
 Rainfall
 Australia, maps for 1916 and 1917, *note*, 373
 Chile, *note*, 370
 China, typhoons of 1911 (Chu), *bibliogr.*, 88
 Galápagos Islands, 237
 India (correspondence), 77
 South Africa (Sim), *bibliogr.*, 463
 Tropical (Fassig), *bibliogr.*, 82
 See also Climatology; Meteorology; U. S. Weather Bureau; Weather
 Raleigh, Walter, 290
 Ramírez F. Fontecha, A. A., 81
 Ramsay, W. M.
 The intermixture of races in Asia Minor: Some of its causes and effects, *rev.*, 85
 Randolph, Isham, 456
 Rasmussen, Knud
 Greenland exploration, *note*, 285
 Över Grönlands Inlandsis: Dagboksblad från "Den första Thule-expeditionen," *rev.*, 296
 Second Thule Expedition, hardships, *note*, 286
 Raveneau, Louis, 183
 Raymond, R. W., *note*, 76
 Réchy, valley of, *note*, 74
 Reclus, Onésime
 Grande Géographie Bong illustrée, Vols. 1 and 2 (Europe), *rev.*, 378
 Reconstruction
 France, *bibliogr.*, 182
 International in Europe (Mackinder), *bibliogr.*, 180
 Reed, A. C., 295
 Regional consciousness, *note*, 515
 Regionalism
 Iberian Peninsula (Merino), *bibliogr.*, 523
 Regions
 Human (Fleure), *bibliogr.*, 528
 Human geography (Fleure), *bibliogr.*, 180
 Natural and administrative, *note*, 372
 Race and region (Wilson), *bibliogr.*, 181
 Religion
 Austria, 57
 Central Hungary, 429
 Rumanians in Hungary, 166
 Slavs of northern Hungary, 276
 Slavs of southern Hungary, 348
 See also Mythology
 Renner, Karl, 417
 Reserve, N. M., topographic sheet, *map*, 378
 Reverdy, Georges, 183
 Reynolds, Elizabeth K. *See* Hapgood, Mrs. Norman
 Rhenish Prussia. *See under* Germany
 Rhine, 91, 94
 Alsace, Lorraine, et France rhénane (Coubé), *rev.*, 183
 As a highway of commerce, 113
 Rhodope Mountains, 30, 31, 32
 Scene in eastern (ill.), 33

- Ricchieri, Giuseppe, 181
- Rice
- French Indo-China, *note*, 453
- Rift Valley of East Africa, 311
- Lake Elmenteita (ill.), 302
- Scene (ill.), 300
- South of Lake Baringo (ill.), 303
- Riga, 471, 472
- Rights, human. *See* Justice
- Rijp, Jan C., 295
- Rikli, M., 181
- Rio Negro Indians, Venezuela, 400
- Ritza Lakes, Caucasus (Morosoff; Posnanski), *bibliogr.*, 521
- Rivers
- Dry river of *nyika* zone, Africa (ill.), 315
- Forecasts of floods in Ohio Valley (Deveraux), *bibliogr.*, 294
- High-water stages (Emigh), *bibliogr.*, 455
- Laws of river development (Gravelius), *bibliogr.*, 528
- Maracaibo lowland, western, typical aspect (ills.), 484, 485
- Mississippi Basin, transportation (Parkins), *bibliogr.*, 292
- River-valley orientation in Canterbury, N. Z. (Speight), *bibliogr.*, 383
- Russian system of navigable (Blanc), *bibliogr.*, 521
- U. S. Weather Bureau service (Henry), *bibliogr.*, 80
- Riviera
- Plant adaptations (Massart), *bibliogr.*, 183
- Roads
- Colorado, abandoned (Shantz), *bibliogr.*, 456
- Portugal, 150
- Roman in Alsace-Lorraine, 93
- Robertson, J. A. T., 295
- Robinson, Doane, 284, 295
- Rockford, Illinois-Wisconsin, topographic sheet, *map*, 519
- Rocky Mountains. *See* Canadian Rockies
- Rocky Mountains Park, Canada
- Vegetation (Lewis), *bibliogr.*, 290
- Roosevelt, Theodore, 379, 460
- Where the steady trade-winds blow, *rev.*, 81
- Rose, J. N., 454
- Roubaud, E., *note*, 74
- Rouch, Louis, 183
- Roussy, Albert, 522
- Rövig, Sverre, 374
- Royal Geographical Society
- Hospitality to American Geographical Society, *note*, 71
- Ruanda, *note*, 372
- Rumania, 36
- Austrian flotilla in the Danube, *bibliogr.*, 84
- Rumanians
- Rumanians in Hungary, The (with maps and diagrs.) (Wallis), 156-171
- Russia
- Bibliography, 521, 522
- Coal fields, *bibliogr.*, 522
- Russia (*continued*)
- Economic data and the journal *Russia*, 479
- Farmers, "dryness" charts for, *bibliogr.*, 522
- Linguistic situation (Meillet), *bibliogr.*, 462
- Manual of geography (Tornauw), *bibliogr.*, 522
- Maps, 522
- Name, 470, 475
- River system (Blanc), *bibliogr.*, 521
- Schematische Karten der Wahrscheinlichkeit des Auftretens der trockenen Dekaden (Brounow), *rev.*, 521
- Ukrainian population, 476
- Village industries (Roussy), *bibliogr.*, 522
- Russians
- White Russians (Pankiewicz), *bibliogr.*, 521
- See also* Ukraine
- Ruthenia, 268
- Ruthenia-Slovakia, 268
- Ruthenians
- Austria, 56
- Hungary, 271
- Name, 475
- S**
- Saarbrücken coal field, 112, 114
- Safford, W. E., 384
- St. Johns, Newfoundland
- Temperature (with graph), 258
- St. Joseph River, Mich., 508, 509
- St. Louis
- Temperature (with graph), 265
- St. Mary's River, Lake Superior, 507, 511
- Ste. Marie-aux-Mines (Markirch) (ill.), 105
- Salminen, C. H., 189
- Saloniki, 25, 32
- Campaign, 21, 29
- Street (ill.), 31
- Salt
- Alsace-Lorraine, 104, 112, 175 (*note*)
- Caicos Islands, 48
- Mexico (Zarate), *bibliogr.*, 81
- Ponds, Grand Turk Island (ill.), 43
- Shipment, Grand Turk Island (ill.), 43
- Turks Islands industry, 42
- Wells, Yünnan, 18
- Salt Cay, 39, 41, 42, 44
- Salt Lake City
- Climate (Thiessen), *bibliogr.*, 457
- Temperature (with graph), 263
- Salvador
- Descriptive data, *bibliogr.*, 81
- Salvesen, T. E., 288
- Salween River, 143
- Geology (Brown), *bibliogr.*, 88
- Samoyeds
- Western boundary at the end of the seventeenth century (Solberg), *bibliogr.*, 522
- Sampson, A. W., 456
- Sams, C. W., 456

- San Blas, Panama
 Porras, B., *bibliogr.*, 81
- San Diego, Cal.
 Excursion to Colorado Desert (Stephens and others), *bibliogr.*, 457
- San Francisco
 Temperature (with graph), 260
- Sancy
 Glaciers (Glangeaud), *bibliogr.*, 182
- Sand dunes. *See* Dunes
- Sandberg, H. O., 81
- Sandstone
 Colorado (Vail), *bibliogr.*, 457
- San Juan, Venezuela, 495
- Santa Ana, Peru
 Temperature (with graph), 249
- Santa Ana River, 483, 484
- Santander, Colombia, 486
- Santander, Spain
 Morphology of the bay of (Cereceda), *bibliogr.*, 523
- Santarem, 154
- Santo Domingo
 Cane sugar industry, *bibliogr.*, 82
 Descriptive data, *bibliogr.*, 82
 United States and (Treudley), *bibliogr.*, 83
- Sardeson, F. W., 294
- Saskatchewan
 Water power (Mitchell), *bibliogr.*, 290
- Saunders, C. F., 456
- Saunders, E. J., 456
- Savana
 Vegetation in Venezuela (ill.), 498
 Venezuela, 482 (ill.), 491, 495
- Savannah River
 High-water stages (Emigh), *bibliogr.*, 455
- Saville, M. H.
 The discovery of Yucatan in 1517 by Francisco Hernández de Córdoba (with maps), 436-448
- Savssats*
 On *savssats*: A crowding of Arctic animals at holes in the sea ice (with map and ills.) (Porsild), 215-228
 Term, meaning and pronunciation, 217
- Scandinavians in the Baltic Provinces, 470
- Scenery
 California (Saunders), *bibliogr.*, 456
 Cascade Range, Oregon (Williams), *bibliogr.*, 457
 National Parks (Yard), *bibliogr.*, 457
 Nicaragua (Wright), *bibliogr.*, 458
- Schafer, Joseph, 456
- Schetelig, J., 525
- Schlich, William
 Forestry in the Dominion of New Zealand, *rev.*, 381
- Schmidt, Axel, 522
- Schneider, C. F., 518
- Schockel, B. H., 464
- Schrader, F., 183
- Schrameier, W., 295
- Schütte, Gudmund, 181
 Ptolemy's maps of northern Europe, *rev.*, 519
- Schwetz, J., *note*, 75
- Scipione, Scipioni, 183
- Scotia* (ship), 526
- Scurvy, 359
- Sea. *See* Oceans
- Sea fowl at *savssats*, 224
- Sea pigeons on Hudson Bay (ill.), 125
- Sea power (Fiennes; Leyland; Piggott), *bibliogr.*, 528
- Seeley, D. A., *note*, 77
- Seismology
 Bible (Montessus de Ballore), *bibliogr.*, 86
 Izalco (Peccorini), *bibliogr.*, 81
 Organization in America (Montessus de Ballore), *bibliogr.*, 464
See also Earthquakes
- Selkirk, Earl of (1771-1820)
 Lord Selkirk's work in Canada (Martin), *rev.*, 290
- Serbia, 21, 24, 25, 26, 34
- Serbians, 34, 35, 341
- Serbo-Bulgarian frontier, 28
 Near headwaters of Pchinya River (ill.), 27
- Serbo-Bulgarian treaty, 21, 24, 35
- Serbo-Croats, 341, 344
 Austria, 56
- Serbs. *See* Serbians
- Serfdom in the Baltic Provinces, 472
- Serows, 10
- Serra da Estrella
 Boulder house; peasant group (ills.), 152
- Setubal, 154
- Seward, A. C., 372
- Shackleton, E. H.
 Antarctic Expedition, *bibliogr.*, 525
Note, 374
- Shaler Mountains, 357
- Shans
 Village of Nam-hu, 138, 139 (ill.)
 Woman at market (ill.), 141
- Shantz, H. L., 456
- Shaw, E. W., 456
- Shaw, Napier, 450
- Sherzer, W. H.
 Detroit folio . . . Michigan, *rev.*, 293
- Shetrone, H. C., 295
- Shih-tien, 134
- Shores. *See* Coasts
- Shortt, Adam, 291
- Shreve, Forrest, 457
- Sicily
 Vegetation (Rikli), *bibliogr.*, 181
- Sierra de Itoto, 386
- Sierra de Ocaña, 386
- Sierra de Perijá
 Camp on southern slope (ill.), 408
 Country to the east, types, 486
 Detail of slopes (ill.), 407
 Distant view (ill.), 494
 Expedition to, *note*, 172
 Exploration, An, of the Sierra de Perijá, Venezuela (with map, diagr., and ills.) (Booy), 385-410
 General view from near La Villa (ill.), 388

Sierra de Perijá (*continued*)

- Grandeur, 493
- Looking along ridge (ill.), 403
- Map, including Western Maracaibo lowland, opp. 496
- Panoramic view (ill.), 404
- Pasture land at foot (ill.), 499
- Ranges (ill.), 392
- Region along eastern foot, 495
- Vicinity of Macoa settlement (ill.), 390

Sievers, Wilhelm

- Süd- und Mittelamerika, *rev.*, 459

Silk

- Lyons (Raveneau), *bibliogr.*, 183

Sinai, Peninsula of

- Geography of west-central, *note*, 452

Singer, D. J., 384

Sinnott, E. W., 382

Sisal

- Caicos Island, 48, 49
- Fiber drying and field, East Caicos (ills.), 47

Sisica

- Rouch, Louis, *bibliogr.*, 183

Skansen, 218, 219, 223, 227

Skoplye. *See* Üsküb

Skykomish Basin, Wash.

- Physiography (Smith), *bibliogr.*, 457

Slavs

- Inaptitude for self-government, 470
- Northern and southern compared, 352
- Race statistics (Niederle), *bibliogr.*, 180
- Slavs of northern Hungary, The (with maps and diagr.) (Wallis), 268-281
- Slavs of southern Hungary, The (with maps and diagr.) (Wallis), 341-353
- War zone (Bailey), *bibliogr.*, 180

Sleeping sickness, *note*, 74-75

Slovachia, 268

Slovaks, 272

Slovenes, 56, 341

Small nations. *See* Nationality; Subject races

Smirnoff, V., 522

Smith, H. L., 526

Smith, J. G., 377

Smith, J. Warren, 293

Smith, K. H., 290

Smith, P. S., 293

Smith, W. S., 457

Snow

- Equatorial peak—Mt. Kenya, *note*, 372

Snow, C. D., 462

Snow Mountain, Yünnan, 10, 11, 15

Social control

- Colonization through, in the Baltic Provinces, 468

Social organization

- Mexico, ancient (Waterman), *bibliogr.*, 81

- Porto Rico (Fleagle), *bibliogr.*, 82

Society

- Physical basis (Kelsey), *bibliogr.*, 528

Soils

- Alabama and west Florida (Harper), *bibliogr.*, 456

Soils (*continued*)

- Florida, west (Harper), *bibliogr.*, 456

- Illinois (Hopkins and others), *bibliogr.*, 294

- New Zealand, proposal for survey (Wild), *bibliogr.*, 383

- Pinellas County, Florida, *map*, 456

Solberg, O., 522

Sonnwendstein

- Die Ergebnisse der meteorologischen Beobachtungen auf dem Sonnwendstein (Hann), *rev.*, 83

South Africa

- Bibliography, 463

- Plant ecology, The, of the Drakensberg Range (Bews), *rev.*, 462

- Rainfall (Sim), *bibliogr.*, 463

- Vegetation, *note*, 452

South America

- Süd- und Mittelamerika, (Sievers), *rev.*, 459

- Tropiska snöfjällets indianer, Det (Bolin-der), *rev.*, 459

- See also* Americas

South Atlantic States

- Bibliography, 455, 456

South Caicos, 45, 46, 48-49

- Salt industry, 48

South Dakota

- Census of 1915 (Robinson and Stevenson), *bibliogr.*, 295

South Dakota-Minnesota-North Dakota

- White Rock topographic sheet, *map*, 519

South Dakota-North Dakota

- New Effington topographic sheet, *map*, 519

South Georgia

- Whale factory and station (ills.), 287

- Whale fisheries, new importance (with ills.), *note*, 286

South Orkney Islands

- Climate (Davis), *bibliogr.*, 525

South Victoria Land

- Geology (Schetelig), *bibliogr.*, 525

Spain

- Agriculture (Bellet), *bibliogr.*, 522

- Bibliography, 522

- Climatology, Quaternary (Obermaier and Carandell), *bibliogr.*, 523

- Mohammedan writings about (B—), *bibliogr.*, 522

- Oceanographic work, *note*, 516

- Production and agrarian wealth (Beltrán y Rózpide), *bibliogr.*, 523

- Traditional divisions (Vergara), *bibliogr.*, 523

- See also* Iberian Peninsula

Speight, R., 383

Sperlin, O. B., 457

Spinden, H. J., 461

Spinning wheel in Europe (Cederblom), *bibliogr.*, 180

Spitaler, R., 85

Spitzbergen

- Economic and political developments, *note*, 374

- Sponges
Caicos Islands, 46, 50
- Sprunt, James
Chronicles of the Cape Fear River, 1660-1916, *rev.*, 518
- Squirrel, flying, 8
- Standard time. *See under* Time
- State, ideal, 413
- Statistics
Honduras (Ramírez F. Fontecha), *bibliogr.*, 81
Mexico, *bibliogr.*, 81
See also Vital statistics
- Steel
Germany, 112, 113
- Stefánsson, Vilhjálmur
Activities, The, of the Canadian Arctic Expedition from October, 1916, to April, 1918 (with map), 354-369
Arctic explorations and routes 1916-1918 (map, revised), opp. 368
Description of fall of meteor, *note*, 282
Lecture of Oct. 31, announcement, 369, 370 (*note*)
Lecture of Oct. 31, brief report, *note*, 454
News of return from Port Yukon, *note*, 282
- Stephens, Frank, 457
- Stevenson, C. S., 295
- Stevinson, Cal., topographic sheet, *map*, 378
- Stewart Island, N. Z., 338
- Stöber, Ehrenfried, 102
- Stohr, F. O., *note*, 75
- Stone, W. E., 377
- Stonerock, Betty, 209
- Storkersen, Storker, 354, 355, 357, 367
- Storms
Dry thunderstorm in California, *note*, 284
Sleet and ice in the United States (Frankenfeld), *bibliogr.*, 80
Thunderstorms in the United States (Alexander), *bibliogr.*, 80
United States, monthly frequency (Kullmer), *bibliogr.*, 292
United States thunderstorms and tornadoes (Ward), *bibliogr.*, 293
See also Hurricanes; Meteorology
- Stose, G. W., 456
- Strasburg, 91, 94, 98, 107
Old part (ill.), 96
- Stresemann, Gustav
On German Imperialism, 465, 466
- Struma valley, 28, 29, 30, 31
- Stuck, Hudson, 369
- Subject races
Austria, 63
Hungary, 156, 433, 434
- Sugar
American industry, commencement, documents on, *bibliogr.*, 82
"Summer time." *See under* Time
- Sumner, F. B., 457
- Sundgau
Langhans, P., *bibliogr.*, 182
- Suomi. *See* Finland
- Supan, A., 520
- Superior, Lake, region
Finns and their distribution (with cartogram), 188, 189, 194
- Superstition
Divining rod, *note*, 76
- Surveying
Aërial, *note*, 71
Americas, desirability of precise triangulation of all (Woodward), *bibliogr.*, 384
Palestine (Watson), *rev.*, 85
Phototopographic, *note*, 71
West River, China, 1916 (Olivecrona), *bibliogr.*, 88
See also U. S. Geological Survey
- Swahili, 304
- Swedish Antarctic Expedition (1902), *note*, 288
- Switzerland
Railway system, *note*, 285
Seasonal migration, *note*, 73
- Syria
Prehistory (Nêophytus), *bibliogr.*, 86

T

- Ta-ku ferry, 11
Gorge near (ills.). 3, 17
- Ta-li fu, 5, 7, 8, 18, 133
From the walls (ill.), 6
- Tamaro, Attilio, 521
- Tana River, 305, 307, 308, 309
Hippopotamus herd on (ill.), 311
- Tangier
Lièvre, D., *bibliogr.*, 379
- Tannenberg, O. R. On Pan-Germanism, 466
- Tannic acid, 488
Trees (divi-divi) producing (ill.), 487
- Tao, L. K., 88
- Tappahannock, Va., topographic sheet, *map*, 456
- Taramelli, Torquato, 181
- Tasman Bay, 331, 333
- Täuber, C., 384
- Taylor, Griffith, 375
Aviation, *note*, 175
Prize thesis, 176
- Taylor, G. I. *See* Matthews, D. J., G. I.
Taylor, and L. R. Crawshaw
- Tea, buttered, 9
- Teachers
Earth Science Section of Central Association, etc. (Mannhardt), *bibliogr.*, 464
National Council of Geography Teachers (Whitbeck), *bibliogr.*, 464
- Temperate zone, 240
- Temperature
Absolute range, 251
Crops and, *note*, 77
Daily range, factors, 266
Real temperatures, The, throughout North and South America (with map and diagrs.) (Jefferson), 240-267
Variability, 250
- Têng-yueh, 145
Street and houses (ill.), 139
- Terra Nova expedition, *note*, 372

- Terraces
 Portugal, wine industry (ill.), 149
- Teutonic Knights and the Baltic Provinces, 471
- Texas
 Forest resources, *note*, 173
- Textiles
 Alsace-Lorraine industry, 104, 106
 Ancient America (Safford), *bibliogr.*, 384
- Thayer, W. N., 81
- Thierry, René, 380
- Thiessen, A. H., 457
- Third Island (Stefánsson's), 361
- Thomar, 155
- Thompson, William
 Portugal: the country and the people (with ill.), 147-155
- Thomsen, Karl, 364
- Thomson, J. A., 383
- Thoré
 Human geography (Reverdy), *bibliogr.*, 183
- Thule Expedition
 First, Rasmussen's journal, *rev.*, 296
 Second, *note*, 286
- Thunderstorms. *See* Storms
- Tibet
 Traveling toward (Andrews), *bibliogr.*, 295
- Tibetans, 14
 Two men with mule (ill.), 14
- Tibeto-Chinese massif
 Structure (Legendre), *bibliogr.*, 88
- Ticks in Venezuela, 499
- Tidd, C. B., 282
- Tides
 Arctic Ocean observations, 359
 Canada, eastern (Dawson), *bibliogr.*, 290
- Timaru, N. Z., 336
- Timber
 Canadian industry, history (Lawler), *bibliogr.*, 290
See also Forests; Trees
- Time
 Daylight saving, *note*, 449
 Standard time at sea, *note*, 374
 "Summer time" in Spain (Barquero), *bibliogr.*, 522
- Toano, Va., topographic sheet, *map*, 456
- Todd, W. E. C., 83
- Toivola, Minn.
 Finnish log cabin (ill.), 195
- Toluca, Mexico
 Temperature (with graph), 244
- Toniolo, A. R., 181
- Topographic maps. *See* United States topographic map; *See also* under British Columbia; Yukon Territory
- Torino y Roldán, José, 380
- Tornadoes
 As climatic phenomena of the United States, *note*, 71
 United States (Ward), *bibliogr.*, 293
- Tornauw, N., 522
- Torner, F. M., 523
- Toronto
 Temperature (with graph), 260
- Torres, Alonzo de, 230
- Torrid zone, 240
- Toul, 92
- Touring Club of Italy
 New atlas projected, *note*, 288
- Towns
 China, life (Leong and Tao), *bibliogr.*, 88
 France, hill towns (Fryer), *bibliogr.*, 182
See also Cities
- Toynbee, A. J.
 Nationality and the war, *rev.*, 179
- Trade. *See* Commerce
- Trails. *See* Roads
- Transhumance, *note*, 73
- Transitional regions, *note*, 516
- Transportation
 Mississippi Basin rivers and the Great Lakes (Parkins), *bibliogr.*, 292
See also Canals; Railroads; Roads; etc.
- Transylvania. *See* Hungary
- Travels
 China (Van Biema), *bibliogr.*, 295
 China; toward Tibet (Andrews), *bibliogr.*, 295
 China, western (Robertson), *bibliogr.*, 295
 Colombia, southern (Miller), *bibliogr.*, 460
 Guiana wilderness (Verrill), *bibliogr.*, 461
 Thrice through the Dark Continent: A record of journeyings across Africa during the years 1913-16 (Du Plessis), *rev.*, 378
 United States, 1793-98 (Moreau de Saint-Méry), *bibliogr.*, 292
 Venezuela, western (Spinden), *bibliogr.*, 461
- Treaty of London
 Tamaro, A., *bibliogr.*, 521
- Trebizond
 Expedition, report (Uspenskij), *bibliogr.*, 87
- Trees, 488
 Baobab (ill.), 306
 Canada (Morton and Lewis), *bibliogr.*, 290
 Divi-divi (ill.), 487
 Dwarf, near Lake Minto (ill.), 121
 Euphorbia, 306 (ill.), 312
 Northern limit (ill.), 118
See also Forests
- Trémaudan, A. H. de, 291
- Trentino
 Trentino, II: Cenni geografici, storici, economici, con un'appendice sul' Alto Adige (Battisti), *rev.*, 83
- Tres Marias
 Natural wealth, *bibliogr.*, 81
- Treudley, Mary, 83
- Triana, Miguel, 461
- Trieste
 Port (Gribaudi), *bibliogr.*, 84
- Tropics
 Temperature uniformity, 240, 245
- Tsamba, 9, 14
- Tsetse fly, problem, *note*, 74-75

- Tucucu Indians, 392, 393, 408 (ill.)
 Turkey in Asia
 From the Gulf to Ararat (Hubbard), *rev.*, 184
 Intermixture of races, The, in Asia Minor: Some of its causes and effects (Ramsey), *rev.*, 85
 Origins, The, of the Islamic state. Being a translation from the Arabic...of... al-Balâdhuri (Hitti), *rev.*, 184
 Oxford pamphlet on, *bibliogr.*, 87
 See also Palestine, Syria
 Turkey in Europe
 Oxford pamphlet on, *bibliogr.*, 87
 Turks
 Palestine (Aaronsohn), *bibliogr.*, 86
 Turks and Caicos Islands, B. W. I.
 Booy, Theodoor de, on (with map and ills.), 37-51
 Map, 38
 Turks Islands, 37, 38, 39, 42
 Tusks
 Narwhals (with ills.), 215, 226, 227
 Typhoons
 China, 1911 (Chu), *bibliogr.*, 88
 Tyrrell, J. B., 177

U

- Udden, A. D.
 Cyclonic distribution of weather elements for Davenport, Iowa, *rev.*, 293
 Uganda
 Boundaries, *note*, 372
 Ugueto, Luis, 461
 Ukraine
 Distinctiveness, 475
 Economic resources, 478
 Extent and population, 476
 Field of German colonization (map), 467
 German colonization, 474
 Map (Dyatchishin), 522
 Ungava Bay, 127
 Divide from Hudson Bay (ill.), 127
 Ungava Peninsula
 Two route surveys across; map incorporating latest sources (maps), opp. 128
 Two traverses across Ungava Peninsula, Labrador (with map and ills.) (Flaherty), 116-132
 Union City, Mich., topographic sheet, *map*, 519
 United Kingdom. *See* British Isles; England; Great Britain
 United States
 Aërological observations (Blair), *bibliogr.*, 80
 Agricultural commerce: The organization of American commerce in agricultural commodities (Huebner), *rev.*, 79
 Anthropology and the government (Hodge), *bibliogr.*, 80
 Anticyclones of the United States, Types of, and their average movements (Bowie and Weightman), *rev.*, 291
 Bibliography, 80, 292

United States (*continued*)

- Census of immigrant stocks (Folkmar), *bibliogr.*, 80
 Coal production and trade (Erskine), *bibliogr.*, 292
 Earthquake problem in West (Wood), *bibliogr.*, 457
 Fertilizers (Pogue), *bibliogr.*, 293
 Fog forecasting (Frankenfield), *bibliogr.*, 80
 Forest fires (Beals), *bibliogr.*, 80
 Geography in (Chisholm), *bibliogr.*, 464
 History, 1793-1798 (Moreau de Saint-Méry), *bibliogr.*, 292
 Iron (Kemp), *bibliogr.*, 292
 Irrigation and drainage (Newell), *bibliogr.*, 292
 Manufactures, history (Clark), *bibliogr.*, 292
 Middle West explorations in 18th century, *note*, 283
 Phosphate (Mansfield), *bibliogr.*, 292
 Resources (Hopkins), *bibliogr.*, 80
 Sleet and ice storms (Frankenfield), *bibliogr.*, 80
 Thunderstorms (Alexander), *bibliogr.*, 80
 Thunderstorms and tornadoes (Ward), *bibliogr.*, 293
 Tornadoes, *note*, 71
 Water, Conservation of: Addresses, etc. McCulloh), *rev.*, 292
 Waterways, natural (Harts), *bibliogr.*, 292
 Waterways versus railways (Moulton), *rev.*, 79
 Weather favorable to forest fires (Beals), *bibliogr.*, 80
 See also America: Americans; etc.
 U. S. Geological Survey
 Topographic instructions (Smith), *bibliogr.*, 293
 United States topographic map
 California, Colorado, New Mexico, Oregon-Washington, Washington, and Wyoming sheets, *maps*, 378
 Delaware, Florida, Florida-Georgia, Georgia, Virginia, Virginia-Maryland, and West Virginia sheets, *maps*, 456
 Illinois, Illinois-Wisconsin, Michigan, Minnesota, Ohio, South Dakota-Minnesota-North Dakota, South Dakota-North Dakota, and Wisconsin sheets, *maps*, 519
 U. S. Weather Bureau
 River service (Henry), *bibliogr.*, 80
 Unstead, J. F., 377
 Upenovik, *note*, 286
 Upham, Warren, 294
 Urabayan, L. J., 523
 Urbanna, Va., topographic sheet, *map*, 456
 Üsküb (Skoplye)
 Buildings on hill (ill.), 23
 Vardar River at (ill.), 27
 Uspenskij, F. I., 87

V

- Vail, C. E., 457
 Vallaux, Camille, 462
 See also Brunhes, Jean, and Camille Vallaux
 Valparaiso
 De Québec à Valparaiso (Goy), *bibliogr.*, 464
 Van Biema, Eduard, 295
 Van Cleef, Eugene
 The Finn in America (with maps and ill.), 185-214
 Van Hise, C. R., 293
 Van Valin, W. B., 177
 Varangians, 470
 Vardar River
 At Üskub (ill.), 27
 Vardar valley, 29, 30
 Railway (ill.), 33
 Variation in animals, 414
 Vasconcellos, Ernesto de, 523
 Vaughan, T. W., 83, 456
 Veer, Gerrit de, 295
 Vegetation
 Cincinnati, Ohio, region (Braun), *bibliogr.*, 294
 Colorado front range foothills (Vestal), *bibliogr.*, 457
 Germania Land, northeast Greenland (Lundager), *bibliogr.*, 296
 Lord Howe Island (Oliver), *bibliogr.*, 382
 New Zealand, *bibliogr.*, 382
 Rocky Mountains Park, Canada (Lewis), *bibliogr.*, 290
 South Africa, *note*, 452
 See also Phytogeography
 Veglia
 Geomorphology (Pawlowski), *bibliogr.*, 85
 Velasquez, Diego
 Treatment of Córdoba, 442
 Venezia Giulia
 Place names (Musoni), *bibliogr.*, 84
 Prehistory (Cumin), *bibliogr.*, 84
 Venezuela
 Atlas de (Lecuna), *map*, 461
 Bibliography, 461
 Descriptive data, *bibliogr.*, 461
 Indian tribes, 389
 Meteorology (Ugueto), *bibliogr.*, 461
 Place names, changed, 492, 496
 Travel in western (Spinden), *bibliogr.*, 461
 Western Maracaibo lowland, The, Venezuela (with map and ill.) (Booy), 481-500
 See also Sierra de Perijá
 Venezuela Falls, 398, 399 (ill.)
 Verendrye family, *note*, 283
 Vergara, G. M., 523
 Verrill, A. H., 461
 Vestal, A. G., 457
 Vianna do Castello, 153
 Victoria, B. C.
 Temperature (with graph), 259
 Victoria Island, 356
 Coast, 357
 Vidal de la Blache, Paul, 184, 528
 "France de l'Est," 89
 Obituary, 77
 Vienna, 65
 Basin of, 53
 Vigié, M., 183
 Villages
 China, life (Leong and Tao), *bibliogr.*, 88
 Village industries in Russia (Roussy), *bibliogr.*, 522
 Villamil, José, 230
 Villar, E. H. del, 523
 Vincent, P., 375
 Vincocaya, Peru
 Temperature (with graph), 248
 Virginia
 Conquest, and Indians (Sams), *bibliogr.*, 456
 Frontier in 1778 (Bushnell), *bibliogr.*, 455
 Kilmarnock, Mathews, Tappahannock, Toano, and Urbanna topographic sheets, *maps*, 456
 Manganese ore (Hewett and others), *bibliogr.*, 456
 Virginia-Maryland
 Ewell and Heathsville topographic sheets, *maps*, 456
 Visher, S. S., 517
 Visser family, 68
 Vital statistics
 Austria, 59
 Hungary, central, 427
 Hungary, southern, 346
 Rumanians in Hungary, 162
 Slavs in northern Hungary, 273
 Vizeu, 153
 Volcanoes
 Galápagos Islands, 233
 New Zealand (Moore), *bibliogr.*, 382
 Vosges Mountains, 91, 92, 106
 Industrial town on slopes (ill.), 105
 Voyages
 Antarctic (Watkin), *bibliogr.*, 525
 Carnegie, sub-Antarctic (Ault), *bibliogr.*, 525
 China coast (Dines), *bibliogr.*, 88
 Cruise of the *Tomas Barrera* (Henderson), *bibliogr.*, 82

W

- Wakamba, 313 (ill.)
 Walker Bay, Victoria Island, 356
 Wallace, W. S., 291
 Wallis, B. C.
 Austria, The peoples of (with maps), 52-65
 Central Hungary: Magyars and Germans (with maps and diag.), 421-435
 Reply to Mark Jefferson, 77
 Rumanians in Hungary, The (with maps and diagrs.), 156-171
 Slavs of northern Hungary, The (with maps and diag.), 268-281
 Slavs of southern Hungary, The (with maps and diag.), 341-353

- Wallula, Wash., topographic sheet, *map*, 378
 Walz, F. J., 515
 Wandorobo, 316
 War, the
 Balkans, The, Macedonia, and the war (with map and ills.) (Woods), 19-36
 Canada, effect (Rabot), *bibliogr.*, 291
 Demographic consequences (Gaillard), *bibliogr.*, 461
 Eastern Europe, *map*, 462
 Economic aspects (Van Hise), *bibliogr.*, 293
 Französisch-belgische Kriegsschauplatz, Der (Philippson), *rev.*, 179
 Geographical elements (Vallaux and Brunhes), *bibliogr.*, 462
 Hungary, effects, 435
 Kriegsgeographie: Erdkunde und Weltkrieg, etc. (Clemenzen), *rev.*, 383
 Nationality and the war (Toynbee), *rev.*, 179
 Weather controls, *note*, 517
 Western front, atlas, *map*, 462
 Western front, *Literary Digest* *map*, 521
 See also Alsace-Lorraine; Europe; France; Germany; Peace
 Ward, R. De C., 71 (*note*), 293
 Weather and war data, *note*, 517
 Washington
 Forts in the fur trade (Sperlin), *bibliogr.*, 457
 Physical geography (Saunders), *bibliogr.*, 456
 Wallula topographic sheet, *map*, 378
 Water buffaloes
 China, 134
 Water power
 Canada, *bibliogr.*, 290
 French Alps, *note*, 451
 French Alps (Blanchard), *bibliogr.*, 182
 Water supply
 Conservation of water (McCulloh), *rev.*, 292
 Water witching, *note*, 76
 Waterfalls
 Macoita River, *note*, 172
 Macoita River, discoveries by T. de Booy, 396
 Povungnituk River (ill.), 125
 Waterman, T. T., 81, 457
 Waterways
 United States, natural (Harts), *bibliogr.*, 292
 Waterways versus railways (Moulton), *rev.*, 79
 See also Canals
 Watkin, E. I., 525
 Watson, C. M.
 Fifty years' work in the Holy Land: A record and a summary, 1865-1915, *rev.*, 85
 Weather
 Cyclonic distribution of weather elements for Davenport, Iowa (Udden), *rev.*, 293
 Favorable to forest fires (Beals), *bibliogr.*, 80
 Weather (*continued*)
 War and, *note*, 517
 See also Climate; Climatology; Hurricanes; Meteorology; Rainfall; Storms; Temperature; U. S. Weather Bureau
 Webster Springs, W. Va., topographic sheet, *map*, 456
 Weddell Sea
 Historical retrospect (Bruce), *bibliogr.*, 525
 Physical condition, *bibliogr.*, 526
 Weightman, R. H. *See* Bowie, E. H., and R. H. Weightman
 Wei-hsi, 15
 Mekong River, valley, and divide near (ills.), 12, 13
 Wellington, N. Z., 329
 Cliffs (ill.), 330
 Coasts (ills.), 332
 Uplifted platform of fault coast (ill.), 331
 See also Port Nicholson
 Welsch, Jules, 183
 West Caicos, 45, 49, 50-51
 West Indies
 Bibliography, 82
 British, commerce with Canada (Griffin), *bibliogr.*, 82
 Canada and (Lewin), *bibliogr.*, 290
 Dutch (Mörzer Bruyns), *bibliogr.*, 82
 Geology of fossil corals (Vaughan), *bibliogr.*, 83
 Hurricanes (Millás y Hernández), *bibliogr.*, 82
 Turks and Caicos Islands, B. W. I. (with map and ills.) (de Booy), 37-51
 Where the steady trade-winds blow (Roosevelt), *rev.*, 81
 West River, China
 Survey of 1916 (Olivecrona), *bibliogr.*, 88
 Yunnan and (Wilton), *bibliogr.*, 295
 West Virginia
 Webster Springs topographic sheet, *map*, 456
 Westerlund, F. W., 200
 Western front. *See under* War
 "Western Sea"
 Explorations to reach, in 18th century, *note*, 283
 Western States
 Bibliography, 456
 Westphalia. *See under* Germany
 Weyl, L. H., 456
 Whales
 Holes in sea ice, 216, 227
 South Georgia fisheries, *note*, 286
 Whangarei Harbor, N. Z. (diagr.), 328
 Whangaroa Harbor, N. Z. (ill.), 358
 Wheaton, Yukon Territory, *map*, 377
 Wheeler, A. O., 377
 Whitbeck, R. H., 464
 White Rock, South Dakota-Minnesota-North Dakota, topographic sheet, *map*, 519
 Whittaker, M. L.
 Pathbreakers and pioneers in the Pueblo region, etc., *rev.*, 377
 Wicker, C. F., 81

- Wild, Frank, *note*, 374
 Wild, L. J., 383
 Wild rice Indians, 507
 Willcocks, William, 87
 Williams, Cal., topographic sheet, *map*, 378
 Williams, I. A., 457
 Williams, M. W., 457
 Willis, Bailey, 454, 513
 Willis, J. C., 382
 Wilson, G. L., 295
 Wilson, Richard, 181
 Wilton, E. C., 295
 Winchell, A. N., 514
 Windermere, B. C., *map*, 377
 Winds
 Bohemia (Spitaler), *bibliogr.*, 85
 "‘Nortes’" in Mexico (López), *bibliogr.*, 458
 "‘Northers’" of the Panama Canal region, *note*, 73
 See also Hurricanes
 Windward Islands
 Meaning of term, *note*, 71-73
 Wine industry
 Portugal, 148
 Quinta and terraces in Portugal (ills.), 149
 Winnipeg
 Temperature (with graph), 259
 Winter Harbor, 355, 359, 361
 Wisconsin
 Neshkoro topographic sheet, *map*, 519
 Wit, Frederick de, 69
 Wittenberg, Leo, 282
 Woehlke, W. V., 457
 Wolff, H., 384
 Wood, E. O., 519
 Wood, H. O., 457
 Woods, H. C., 87
 Balkans, The, Macedonia, and the war (with map and ills.), 19-36
 Woodward, R. S., 384
 Wordie, J. M., 525, 526
 World as a whole and larger parts
 Bibliography, 463, 464
 Compendio de la historia general de América (Navarro y Lamarca), *rev.*, 463
 Kriegsgeographie: Erdkunde und Weltkrieg, etc. (Clemenzenz), *rev.*, 383
 Philips' Record Atlas (Philip), *maps*, 384
 Wright, H. M., 458
 Wright, I. A., 82
 Wrong, G. M., 291
 Wu Hung-tao, 4
 Wulff, Thorild, *note*, 286
 Wyandot Indians, 509
 Wynniatt Bay, 357
 Wyoming
 Moorcroft topographic sheet, *map*, 378

X

X—, 183

Y

- Yana Indians
 Waterman, T. T., *bibliogr.*, 457
 Yangtze River, 15, 16
 Gorge near Ta-ku ferry (ills.), 3, 17
 Unmapped country between Yangtze River and Chung-tien road (ill.), 13
 Upper (Carter), *bibliogr.*, 88
 Yard, R. S., 457
 Yellow fever
 Panama and Cuba (LePrince and Arenstein), *bibliogr.*, 458
 Yellow Sea
 Meteorological phenomena ((Dines), *bibliogr.*, 88
 Yucatan
 Discovery, The, of Yucatan in 1517 by Francisco Hernández de Córdoba (with maps) (Saville), 436-448
 Present coast line to illustrate Córdoba's landfall (map), 437
 Route of Córdoba on his voyage of discovery (map), 437
 Yugo-Slavia, 343, 345
 Yugo-Slavs, 341
 Yukon Territory
 Bibliography, 377
 Wheaton, *map*, 377
 Yung-chang, 133
 Country near (ill.), 135
 Yünnan
 Geology (Brown), *bibliogr.*, 88
 Routes of R. C. Andrews (map), 2
 West River and (Wilton), *bibliogr.*, 295
 Zoölogical explorations in Yünnan Province, China (with map and ills.) (Andrews), 1-18
 Yünnan fu, 4, 5

Z

- Zanzibar, *note*, 372
 Zarate, J. C., 81
 Ziegler, Victor, 457
 Zinn, A. S., 81
 Zones, time, *note*, 374
 Zoögeography
 Africa, faunal regions, based on distribution of fishes, *note*, 371
 Galápagos Islands, 234, 236
 Geographical barriers, The, to the distribution of big game animals in Africa (with maps and ills.) (Heller), 297-319
 Moa, extinction (Downes), *bibliogr.*, 382
 See also Animals
 Zoölogy
 Yünnan, 1-18
 Zskhra-zskharo
 Smirnoff, V., *bibliogr.*, 522

ERRATA

- Pl. II, facing p. 64: *the blue band surrounding the green nucleus in the northwest corner of Bohemia should be colored pink, i. e. to indicate a population density of 100-150 per sq. km.*
- p. 71, line 11 from bottom: *for 320 read 319.*
- p. 95, line 12: *for Neufchateau read Neufhâteau.*
- p. 98, line 13: *for in 1684 read in 1648.*
- p. 113, line 2: *for 9,000 tons read 9,000,000 tons.*
- p. 113, line 3: *for 15,600 tons read 15,600,000 tons.*
- p. 113, line 4: *for 31,800 tons read 31,800,000 tons.*
- p. 139, line 2 of title of Fig. 3, and line 1 of title of Fig. 4: *for Teng-yueh read Tèng-yueh.*
- p. 165, Fig. 3: *for Seale, 1: 5,700,000 read Seale, 1: 4,200,000.*
- p. 172, lines 5 and 23: *for La Morqueta read La Horqueta.*
- p. 172, line 27: *for two days' ride read two days' journey.*
- p. 190, line 2 of title of Fig. 4: *for Embarass read Embarrass.*
- p. 193, line 2 of title of Fig. 5: *for Embarass read Embarrass.*
- pp. 229-239: *throughout the article the name Galápagos should thus be accented.*
- p. 232, line 2 from bottom of footnotes: *delete comma at end of line.*
- p. 289, line 5 from bottom: *the publication by Señor Massip referred to was not, as stated, reviewed in the same number of the Review.*
- p. 370, line 25 from bottom: *for Symons's Meteorol. Journ. read Symons's Meteorol. Mag.*
- p. 371, line 14 from bottom: *for any read all.*
- p. 382, line 17: *for Andrew, E. C. read Andrews, E. C.*
- pp. 385-410: *throughout the article the name Apón River should thus be accented.*
- p. 436, line 4 of footnote 3: *for Baek read Traek.*
- p. 454, line 5: *Mr. De Booy's lecture took place not, as stated, on December 17, 1918, but on January 7, 1919.*
- p. 458, lines 1 and 6 of second title: *for LePrinee read Le Prinee.*
- Pl. XVIII, facing p. 502: *in lower right corner, for Grizzley Mtn. read Grizzly Mtn.*
- Pl. XVIII, facing p. 502: *should be numbered Pl. XXI.*

ADDITIONAL ERRATA IN PREVIOUS VOLUMES

Vol. I

- p. 471, line 15: *for Vol. 9, 1915, read Vol. 11, 1915.*

Vol. IV

- p. 242, map: *name of strait between Banks and Victoria Islands should read Prince of Wales Strait.*
- p. 468, Fig. 2, add source: *Based on a map on p. 25, Vol. 2, of "Magyarország", Budapest, 1891 (Vol. 7 of "Az Osztrák-Magyar Monarchia Írásban és Képen").*

Vol. V

- p. v, line 6 under "North America": *for Exploraton read Exploration.*
- p. 57, title of Fig. 5: *for Seale, 1: 8,750,000 read Seale, 1: 11,600,000.*
- p. 149, line 36: *for Strassfurt read Stassfurt.*
- p. 240, line 2 of title of Fig. 1: *for Scale, 1: 7,400,000 read Seale, 1: 11,000,000.*
- p. 558, line 17 of "Errata": *for p. 346 read p. 345.*

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